SR-89 Cascade to Rubicon Bay Bikeway Study

FINAL
February 21, 2003

Prepared For: California Department of Transportation

Prepared By: Alta Planning + Design

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Bikeway Study

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The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

1. INTRODUCTION

The SR-89 Cascade to Rubicon Bay Bikeway Study examines options for developing bicycle facilities on or adjacent to State Route 89 in the Cascade to Rubicon Bay corridor. This corridor is the only remaining segment of highway around Lake Tahoe to be studied in detail for the possibility of accommodating bicyclists, and one of the most challenging sections of the Lake for developing either on- or off-street bicycle facilities. The project study area encompasses the State Route 89 (SR-89) right-of-way from approximately Camp Richardson to Meeks Bay, as well as lands along the highway under the ownership of California State Parks, US Forest Service, or private landowners. Throughout this corridor, SR-89 is a two-lane highway extending through curving and mountainous terrain.

The purpose of this Bikeway Study is to:

- Document existing conditions based on aerial and topographic mapping and field review information;
- Provide background on the project history, goals, affected agencies, and relationship to existing plans and other relevant documents;
- Identify potential SR-89 Cascade to Rubicon Bay bikeway users and their needs;
- Identify constraints along the corridor including environmental conditions, construction and engineering challenges, and operational issues related to the highway;
- Develop alternative bikeway alignments and potential non-bikeway solutions where constraints cannot be overcome in either the short or long-term;
- Develop design standards to facilitate the design process and ensure consistency with established state and national standards; and
- Provide phasing and funding details for project implementation.

The document is organized as follows:

- Chapter 2: Existing Conditions
- Chapter 3: Conceptual Bikeway Alternatives
- Chapter 4: Preferred Bikeway Concepts
- Chapter 5: Design Guidelines
- Chapter 6: Phasing and Implementation
- Chapter 7: List of Preparers and Task Force Members

2. EXISTING CONDITIONS

INTRODUCTION

This chapter provides a description of existing conditions along the State Route 89 Cascade to Rubicon Bay corridor. Information is based on field visits, U.S. Forest Service GIS map layers, USGS topographic maps, existing planning documents, aerial photographs, and conversations with Caltrans, the Tahoe Regional Planning Agency, U.S. Forest Service, and other state and local agency staff.

BACKGROUND

PROJECT SETTING AND HISTORY

Completion of a Class I bikeway around Lake Tahoe has long been an objective of local planners and bicycle advocates. Stemming from this interest, the Lake Tahoe Bikeway 2000 was initiated by the Tahoe Regional Planning Agency in the early 1990s. The project was intended to provide for a complete connected loop of bike lanes and paths around the Lake by the year 2000. Although the original goal date has passed, much of the Bikeway 2000 network has been implemented. The SR-89 Cascade to Rubicon Bay corridor is the only remaining corridor to be studied in detail for the possibility of accommodating a bikeway, and one of the most challenging sections of the Lake for accommodating either on- or off-street bicycle facilities.

OVERVIEW OF CORRIDOR

The project study area encompasses the State Route 89 (SR-89) corridor from Cascade to Rubicon Bay. **Figure 2-1, Location Map** shows the regional location of the project site, and **Figure 2-2, Corridor Vicinity Map**, shows a detailed view of the project corridor area. The official Caltrans project study segment is approximately 9 miles in length (Post Mile 13.24 to Post Mile 22.24), although the scope of this document covers the corridor from approximately Camp Richardson to the Meeks Bay area. Throughout this corridor, SR-89 is a two-lane highway extending through curving and mountainous terrain. The average lane width through the corridor is 11 feet with little or no shoulder area (standard lane width for highways is 12 feet).

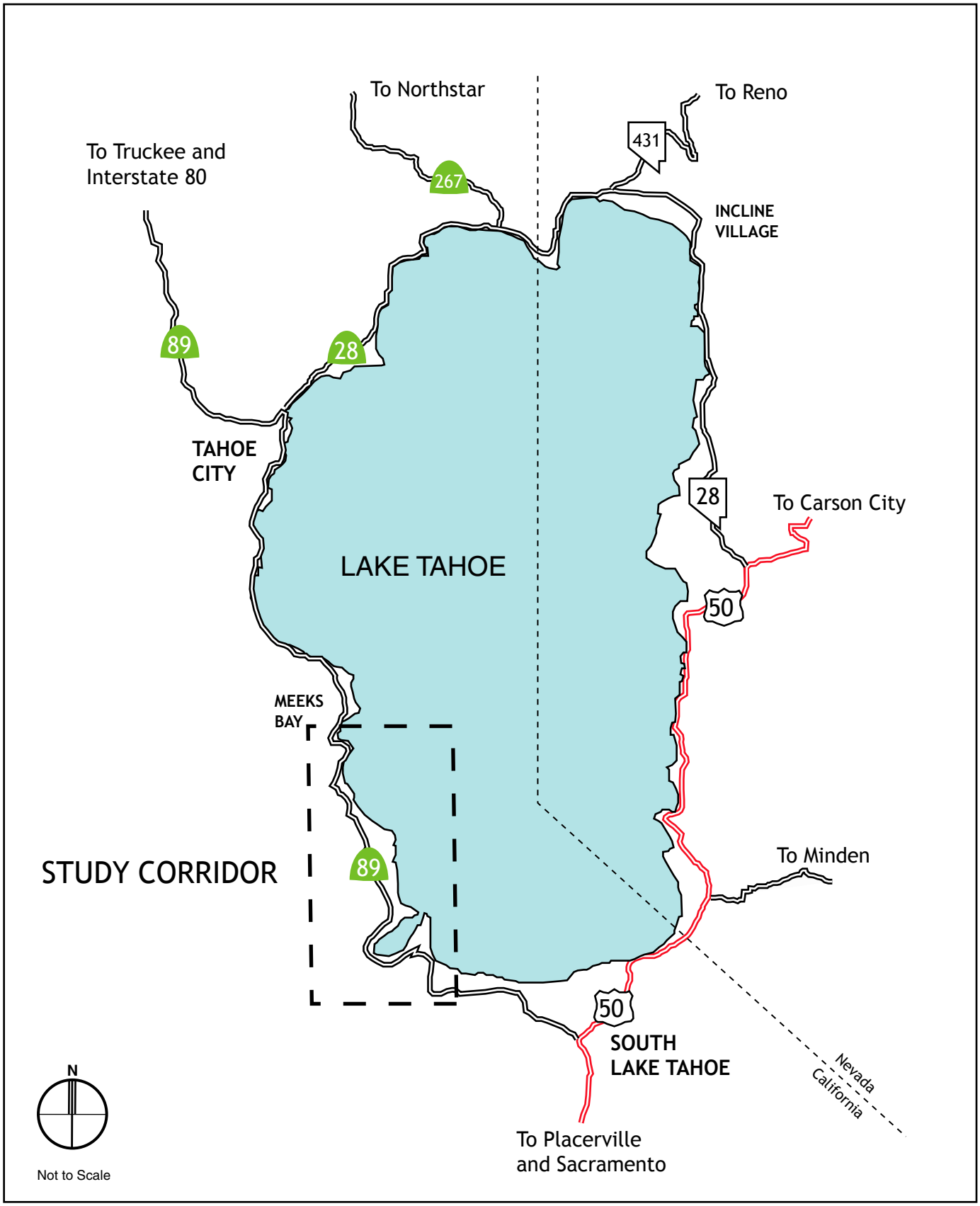

Figure 2-1
Location Map

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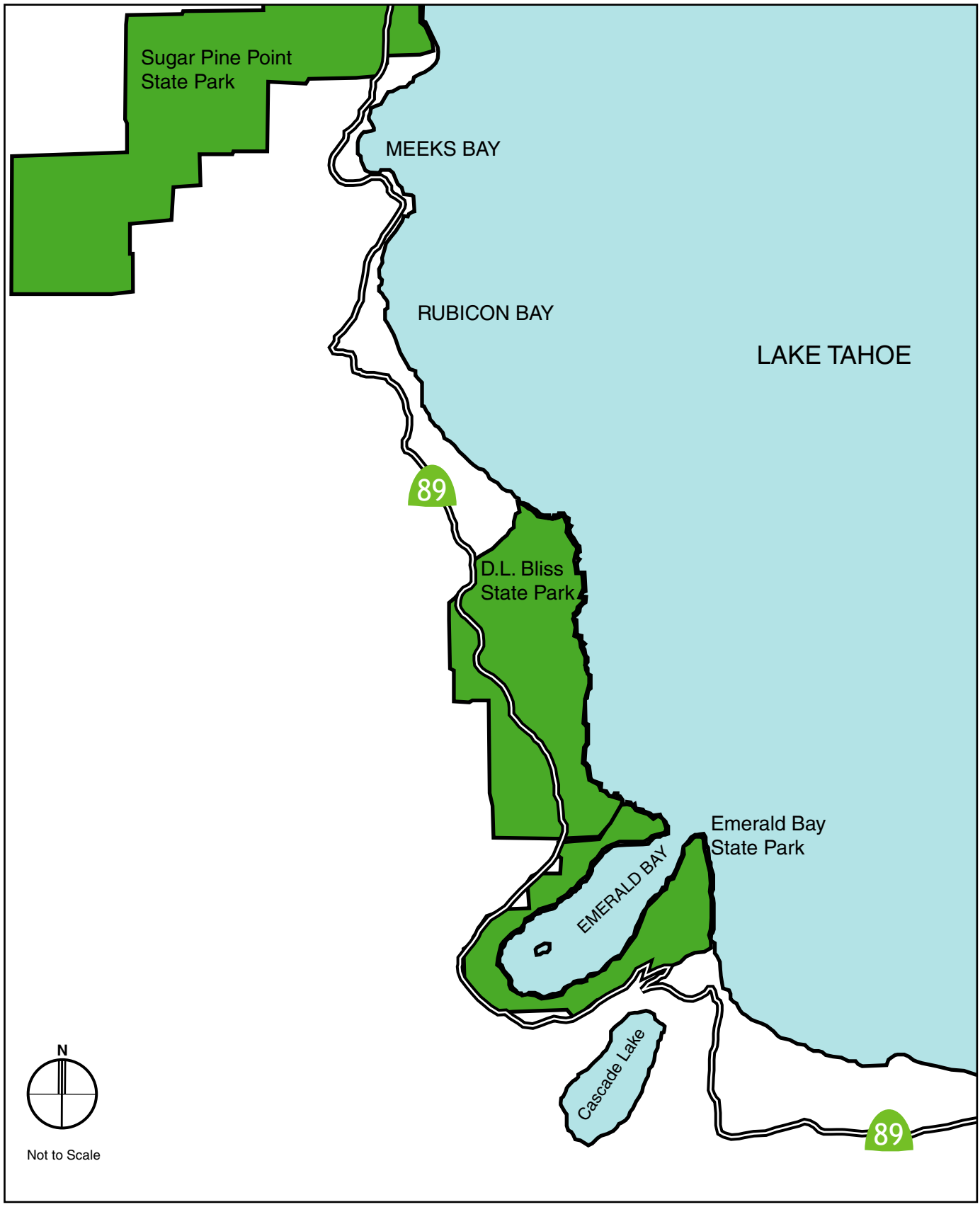

Figure 2-2
Corridor Vicinity Map

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State Route 89 is a north-south highway that originates off US 395 north of Topaz, California, and extends in a northwesterly direction through the northern Sierra Nevada, terminating at Interstate 5 near the town of Mount Shasta. In the Lake Tahoe area, SR-89 extends north over Luther Pass from Hope Valley to Meyers, where it joins with US 50. At South Lake Tahoe, the two highways split, with SR-89 extending north along the west shore of the Lake to Tahoe City. At Tahoe City, SR-89 continues north to Truckee where it connects to Interstate 80.

GOALS AND OBJECTIVES

The Lake Tahoe Basin has been steadily developing bicycle facilities for residents and visitors over the past 20 years. Due to the success of these facilities and the overall health, transportation, and air quality benefits of encouraging bicycling, a major regional goal has been to complete a bikeway system around the Lake. One of the major existing gaps in that system is the segment around Emerald Bay. The SR-89 Cascade to Rubicon Bay bikeway, when completed, will improve safety, attract a greater diversity of bicyclists, help reduce traffic congestion, improve air and water quality, and have direct health benefits to residents and visitors.

The overall goals and objectives for the project are identified below.

Goal 1: The project should improve safety conditions for bicyclists in the corridor.

Objective A: Safety. Maximize safety for all non-motorized and motorized users through the corridor.

Objective B: Conflicts. Minimize potential conflicts between pedestrians, bicyclists, and motor vehicles.

Goal 2: The project should provide the maximum benefits to the public.

Objective A: Positive Environmental Benefits. Enhance the overall environment in the corridor by helping to reduce vehicle traffic and parking and improving access to environmental resources to the public.

Objective B: Connectivity. Provide links and improves access to important destinations along the corridor including Inspiration Point, the Eagle Falls parking area, the Vikingsholm parking area, D.L. Bliss State Park, and Meeks Bay.

Objective C: Range of User Groups. Maximize the range of potential users of any new facility or service, including users of all ages and abilities. Understand the needs, capabilities, and interests of each user group, and consider this in the design of any solution(s).

Objective D: Function. Maximize the functional aspects of any recommendation in terms of convenience, gradients, availability, directness, access, cost, and connectivity to major destinations.

Objective E: Cost Effectiveness. The project should offer the best combination of effectiveness with lowest capital and operating cost, and should be consistent with existing and future local and regional improvement projects wherever possible.

Objective F: Transportation. The project should offer a transportation benefit to the region by offering an effective alternative to the motor vehicle, whether that is for work or recreational trips. The project should enhance overall transportation mobility and options in the area.

Objective G: Visual Amenity. The project should offer an enjoyable experience for users, including access to visual, cultural, and natural resources

Objective H: Recreation Amenity. The project should improve access to recreational amenities.

Objective I: Seasonality. The project should remain functional as long as possible for the course of a year.

Goal 3:The project should minimize negative impacts to the environment and local communities.

Objective A: Environment. The project should not result in significant negative environmental impacts in terms of direct construction impacts (water quality, historical and archaeological resources, etc.) and indirect impacts (increased demand on local resources such as Emerald Bay that are already over capacity, traffic capacity, financial resources, etc.).

Objective B: Property Impacts. The project should avoid or minimize impacts to private property and residential neighborhoods, including the need to acquire right of way or easements.

Objective C: Visual Impacts. The project should not result in significant impacts to the visual resources of the corridor, especially in the Emerald Bay area.

Objective D: Parking. Localized parking demand associated with the project should not have a negative impact in local neighborhoods.

Goal 4: The project should be consistent with adopted policies, standards, and goals.

Objective A: Consistency: The project is consistent with the local, regional, and State adopted standards, policies, and goals.

USER GROUPS

Consideration of the type of cyclist user group that will utilize the SR-89 Cascade to Rubicon Bay corridor is an important aspect of this Bikeway Study. Different types of cyclists will demand widely different types of facilities, and what is desirable by one user group may be completely inappropriate for another. This section describes the typical cyclist user groups in an attempt to define what types of bikeway facilities may be best suited for their specific needs.

Recreational Cyclists

The term "recreational" cyclist covers a broad range of skill and fitness levels. Recreational cyclists can range from a hardcore racer who does 100-mile rides each weekend to a family with young children who occasionally want to ride a couple miles down a quiet bike path. A cyclist's level of skill, fitness, and comfort on the road will determine what type of facility they are looking for. In order to characterize these differences, this study breaks Recreational Cyclists into two subcategories: "Road Cyclists" and "Casual Cyclists," acknowledging that these are generalizations and that the average cyclist may have attributes of both user groups.

Road Cyclists

Road cyclists are those who will bike almost exclusively on street, because roadways are the type of facility that accommodates their desire for higher speeds, longer distances, and few conflicts with other recreational users. Typical trip distances for the road cyclist can range from 20 miles to over 100 miles. While the average road cyclist would likely prefer to ride on roads with little or no traffic, they are generally comfortable riding in traffic if necessary. To this end, a road cyclist will tend to ride in a manner similar to a motor vehicle (e.g. when approaching traffic signals or making left turns). Road cyclists are typically not seeking a recreational destination along the route, as the ride itself is the recreation. In fact, special cycling clothing and shoes tend to limit the ability of the road cyclist to walk around off the bike.

In the uphill direction, road cyclists will typically be traveling slower than motor vehicles, and will normally try to keep as far right as possible. In these areas extra shoulder width is helpful in giving vehicles additional room to pass. On downhill descents, skilled road cyclists can often travel at, or even faster than the speed of traffic. In these situations, they will normally move toward the center of the lane to provide easier maneuverability. On winding descents, skilled cyclists can take corners faster than vehicles, and it is not uncommon for a road cyclist to get stuck behind a line of vehicles on a twisty descent.

Due to the relatively narrow width and thin casing of standard road bike tires, road cyclists are often susceptible to flat tires. As such, road cyclists are very concerned about glass, rocks, and other debris on the road or in the shoulder. In addition, loose material on the road such as sand or gravel can cause skinny road tires to lose traction and wash out on curves. Since most road debris tends to end up in the shoulder, road cyclists will tend to move into the travel lane if any debris is present in the shoulder that might cause a flat tire or other hazard. This can sometimes lead to conflicts with motor vehicles, as many motorists don't understand why a cyclist is riding in the lane if there is a seemingly good shoulder available.

Although very dependent on the fitness level of the rider, topography is less of a limiting factor for road cyclists; in fact, many road cyclists seek out routes that involve challenging and scenic terrain, which is often hilly. For an experienced road cyclist, the SR-89 Cascade to Rubicon Bay corridor might be part of a ride around Lake Tahoe or, for cyclists on the north shore, part of a ride south toward Luther Pass.

Casual Cyclists

Casual recreational cyclists are those who generally want to ride on off-street bike paths, are seeking a more relaxed cycling experience, and cover shorter trip distances at slower speeds. Casual cyclists will tend to do trips of less than 10 miles in length, and often ride more comfort-oriented bikes, hybrid or mountain bikes. Casual cyclists may ride as a family group, with children, and because they are more likely to ride with others of varying skill and fitness levels, flat topography is generally desired. Casual cyclists are typically not comfortable riding in traffic, and will avoid riding on busy streets when possible, riding on the sidewalk if necessary. Bike routes that extend through low-traffic residential streets are generally acceptable for casual cyclists, even if they are not the most direct route between destinations. Casual cyclists may load their bikes in their cars and drive to a bike path, and are more likely in need of parking areas. Having recreational amenities and features along the route is more important to the casual cyclists, such as drinking fountains, shaded areas, picnic tables, interpretive signs, and scenic vistas. Recreational destinations are also important for casual cyclists, as they provide a place to stop and get off the bike and walk around. To this end, having secure bike parking at destinations is important.

For the average casual cyclist, portions of the SR-89 Cascade to Rubicon Bay corridor may be too challenging, regardless of the type of facility that is installed. Families with small children, or those less inclined to tackle hills, may want to avoid the type of steep topography that presents itself along the corridor. As such, the area between Cascade Creek and Vikingsholm would likely have limited appeal to the casual cyclist. However, other areas of the corridor, such as between D.L. Bliss State Park and Meeks Bay, topography is not as extreme and opportunities for flatter trails that would appeal to casual recreational cyclists are possible.

Commuter Cyclists

The SR-89 Cascade to Rubicon Bay corridor does not appear to have large potential to serve commuter cyclists. The nearest population center along the corridor would be the Rubicon Bay and Meeks Bay communities. It is not anticipated that a large number of bicycle commuters would travel between those areas and employment centers in South Lake Tahoe. However, there may be some individuals who would commute via this route. Commuting this segment of highway would be limited to the summer and fall months when the road is free of snow. Due to the length and topography of the trip, the characteristics of these commuters would be expected to generally match the road cyclist category, in that they would be seeking a direct, on-road route through the corridor.

Utilitarian Cyclist

Utilitarian cycling trips refer to the use of the bicycle for shopping, errands, and other local trips. As with commuting, for most local residents of the Rubicon Bay and Meeks Bay communities, using a bicycle for utilitarian trips would not be practical due to the distance to major shopping areas in South Lake Tahoe.

However, there may be some potential for the corridor to accommodate "recreation-related utilitarian" trips, meaning those trips between the camping areas small shopping areas within the corridor. These may include trips between D.L. Bliss State Park and the small grocery store at Meeks Bay, or trips between Eagle Point Campground and the Camp Richardson area. In these cases, visitors to the area who have limited shopping needs could combine a utilitarian trip to the store with a recreational trip, if a desirable bicycling facility was available. These types of desired facilities of the recreational utilitarian trip would likely be similar to those desired by the casual recreational cyclist, e.g. off-street facility, short distance, with recreational amenities along the way. Residents of the Rubicon and Meeks Bay communities may also conduct some recreation-related utilitarian trips, such as riding from their homes to local beach or park areas.

PLANNING AND POLICY CONTEXT

This section discusses the key public agencies involved in the SR-89 Cascade to Rubicon Bay Bikeway Study, and major relevant planning and policy documents prepared by each.

AFFECTED AGENCIES

California Department of Transportation

The State of California, Department of Transportation (Caltrans) is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Caltrans has jurisdiction over the SR-89 right-of-way, and is serving as the lead agency for this bikeway study.

Tahoe Area Projects

As part of its role in implementing the Lake Tahoe EIP, Caltrans is conducting a number of roadway-related improvement projects around the Basin. Many of these projects are intended to improve water quality or scenic quality along area highways, but provide transportation and recreation benefits as well. Current Caltrans EIP project on the SR-89 corridor in El Dorado County (Placer County to Alpine County lines) include the following:

Emerald Bay Viaduct Scenic Restoration (EIP Project No. 608). This project is intended to improve scenic quality of the area impacted by the Emerald Bay viaduct by reducing the current high color contrast associated with the viaduct. The scenic threshold will be improved by implementation of this project.

Cascade Creek Area Retaining Walls (EIP Project No 873). This project will develop scenic quality treatment for existing smooth-surfaced concrete retaining walls between Cascade Creek and Emerald Bay. The intent of the project is to reduce the current high contrast associated with the existing smooth finish of the concrete retaining walls and the surrounding more natural backdrop. Implementation of this project is expected to improve the scenic environmental threshold.

Stormwater Quality Improvements (EIP Project No 995.1). Caltrans intends to install stormwater runoff collection, treatment and conveyance facilities along approximately 27.41 mile of SR 89 in El Dorado County. The planned stormwater runoff and erosion control BMP's are intended to minimize runoff pollution that could enter Lake Tahoe. This project anticipates improvement in the water quality and soil conservation environmental thresholds.

Deputy Directive 64

Deputy Directive (DD) 64 requires that Caltrans "fully considers the needs of non-motorized travelers (including pedestrians, bicyclists and persons with disabilities) in all programming, planning, maintenance, construction, operations and project development activities and products." As part of this policy, Caltrans adopts the U.S. Department of Transportation's Policy Statement on Integrating Bicycling and Walking into Transportation Infrastructure, which provides design guidance on accommodating bicycle and pedestrian travel. DD 64 identifies numerous Department responsibilities to ensure that the needs of non-motorized travelers are incorporated into all Caltrans activities. The SR-89 Cascade to Rubicon Bay Bikeway Study, by evaluating options for improving bicycle access along a State Highway facility, is in compliance with DD 64.

Tahoe Regional Planning Agency

The Tahoe Regional Planning Agency (TRPA) was formed in the late 1960s when the governors and lawmakers in California and Nevada approved the Tahoe Regional Planning Compact, establishing a regional planning agency to oversee development at Lake Tahoe. In 1969, the United States Congress ratified the agreement and created the TRPA. The Compact, as revised in 1980, gave TRPA authority to adopt environmental quality standards, called thresholds, and to enforce ordinances designed to achieve the thresholds. The TRPA's mission is to lead the cooperative effort to preserve, restore, and enhance the unique natural and human environment of the Lake Tahoe Region.

TRPA is the designated Regional Transportation Planning Agency (RTPA) for the California portion of the Tahoe Region. More recently, TRPA was designated as a federal Metropolitan Planning Organization (MPO). Being an MPO, TRPA now receives planning funds through the Federal Highway Administration and is responsible for addressing Federal emphasis areas of transportation planning. TRPA is currently in the process of updating the 1992 Regional Transportation Plan (RTP), which will provide the foundation for transportation planning in the Tahoe Region.

Lake Tahoe Environmental Improvement Program

The Lake Tahoe Environmental Improvement Program (EIP) is an integrated improvement program designed to accelerate achievement of environmental threshold carrying capacities established for the Lake Tahoe Region. The EIP strategy is designed to accomplish, maintain, or exceed multiple environmental goals and develop an integrated, proactive approach to environmental management within the Region. The threshold standards are long-term and define a level of environmental quality that the Region desires to achieve. The EIP document describes actions that need to be implemented to attain and maintain environmental threshold carrying capacities for nine established indicators:

- Water quality
- Soil conservation
- Air quality
- Vegetation
- Wildlife habitat
- Fish habitat
- Recreation
- Scenic resources
- Noise

Volume 2 of the EIP provides a comprehensive master list of science, program, and project needs that are necessary to restore and maintain environmental thresholds for the Lake Tahoe Basin. These actions are intended to occur over a twenty-year timeframe to achieve thresholds. Eligibility requirements for inclusion into the EIP are found in the TRPA's Code of Ordinances, and generally state that a project must directly relate to the respective threshold program and contribute to the attainment of that threshold. In total, the EIP identifies over 700 projects and programs needed to meet the environmental thresholds. The EIP also identifies the many agencies and organizations at the federal, state and local levels responsible for funding EIP projects and programs. The EIP was most recently updated in 2001.

The Air Quality/Transportation Threshold Program of the EIP includes several bikeway projects along or connecting to the SR-89 Cascade to Rubicon Bay corridor, listed below (project descriptions and lead agency identifications come directly from the EIP).

- Class I: SR-89 Spring Creek to Cascade [EIP Project Number 766]. A Class I bicycle trail will be constructed from the current end of the USFS bicycle trail at Spring Creek Tract to Cascade Properties. *Lead Agency: El Dorado*
- Class III: SR-89 Cascade to Emerald Bay (North End) [EIP Project Number 765]. A Class III bicycle trail will be developed to connect from the eventual end of the Class I trail at Cascade to the north end of Emerald Bay. *Lead Agency: Caltrans*
- Class I: Emerald Bay (North End) to D.L. Bliss State Park [EIP Project Number 764]. A Class I bicycle trail will be developed from the north end of Emerald Bay to D.L. Bliss State Park. *Lead Agency: California State Parks*
- Class I: D.L. Bliss to Meeks Bay [EIP Project Number 10039]. Construct a Class I trail between D.L. Bliss State Park and Meeks Bay. *Lead Agency: USFS*
- West Shore Bike Trail Extension and Improvements [EIP Project Number 10042]. Extend the TCPUD paved trail from its current terminus at Sugar Pine Point State Park to Meeks Bay Resort and filling in missing links in the existing West Shore trail network. *Lead Agency: TCPUD*

Regional Transportation Plan

The Regional Transportation Plan (RTP) was released by TRPA in August 2000. This is the official State and Federally recognized Regional Transportation Plan required of Regional Transportation Planning Agencies and Metropolitan Planning Organizations. The RTP is currently going through an update process scheduled to be complete by early 2004. The 2004 update will begin the process of incorporating the 2000 RTP and TRPA's 1992 RTP/Air Quality Plan into one uniform document. (The 1992 RTP/AQP is not the State and Federally recognized Regional Transportation Plan, but is a TRPA Plan required by the Agency's Federal Compact requirements.)

Lake Tahoe Regional Bicycle and Pedestrian Master Plan

The Lake Tahoe Regional Bicycle and Pedestrian Master Plan was released in Draft form in August of 2001, and is currently in the process of being finalized by TRPA. The Master Plan is intended to provide a blueprint for developing a regional bikeway and pedestrian system that includes both on-street and off-street facilities as well as support facilities and programs throughout the Lake Tahoe region. The Master Plan includes a map of proposed facilities for the region. Within the project corridor, SR-89 is designated as a proposed Class III Bike Route from the terminus of the Pope-Baldwin Bike Path north to D.L. Bliss State Park, and as Class II bike lanes from D.L. Bliss to Meeks Bay, where it will connect to the planned extension of the West Shore Bike Path.

Fallen Leaf Lake and Emerald Bay Transportation Study

The Fallen Leaf Lake and Emerald Bay Transportation Study was prepared by the TRPA in 1998. The purpose of the study was to identify transportation problems along the SR-89 corridor near Fallen Leaf Lake and Emerald Bay, and to evaluate alternatives to improve transportation in the area. Problems identified in the Emerald Bay area were primarily related to insufficient parking supply for the high-demand recreational areas, including Vikingsholm, Inspiration Point, the Bayview trailhead, and Eagle Falls. Data collection efforts included traffic volume counts, parking counts, vehicle travel time, parked vehicle surveys, and an on-board survey of riders of the Emerald Bay Tram. Data and conclusions from the Fallen Leaf Lake and Emerald Bay Transportation Study will be described in more detail in the discussion of transit-related alternatives in the SR-89 Bikeway Study.

County of El Dorado

El Dorado County covers about 1,800 square miles, extending from the foothills above the Sacramento Valley east to the southwest portion of Lake Tahoe. El Dorado County is bordered by Placer County on the north, Sacramento County on the west, Amador County on the south, Alpine County to the southeast, and the State of Nevada to the east. El Dorado County is home to about 158,000 residents; South Lake Tahoe is the largest city in the County, with a population of about 24,000 residents, followed by Placerville with just under 10,000 residents. The El Dorado County main government offices are located in Placerville. The entire project area is located within unincorporated El Dorado County.

El Dorado County General Plan

The current El Dorado County General Plan was adopted in January 1996, and provides for long-range direction and policy for the use of land within the County. The General Plan is currently in

the process of being updated. The following policies of the Tahoe Basin element of the current General Plan apply to the proposed project:

Objective 11.1.12, Parks and Recreation: Development of recreational facilities for the differing needs of residents through utilization of available outdoor recreation capacity.

Policy 11.1.12.4: Plan, develop, and maintain a network of County-wide regional trails that connect incorporated and unincorporated areas through cooperative efforts with the City of South Lake Tahoe, the Tahoe Conservancy, and other agencies.

Objective 11.2.2, Regional Bikeways: Locate regional bikeways where environmentally, physically, and economically feasible.

Policy 11.2.2.1: The County shall continue working with Caltrans to develop bicycle trails along designated scenic highways within State right-of-ways.

Lahontan Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board (RWQCB) is one of the nine regional boards of the State Water Resources Control Board (SWRCB). The SWRCB, a branch of the California Environmental Protection Agency, was created by the Legislature in 1967. The mission of the RWQCBs is to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters. Each RWQCB is responsible for developing a Water Quality Control Plan (commonly called the "Basin Plan") for their hydrologic areas, issuing waste discharge requirements, taking enforcement action against violators, and monitoring water quality. The Lahontan Region (Region 6) includes about 20 percent of California from the Oregon border south along the eastern crest of the Sierra Nevada through the northern Mojave Desert. The project area is located within the Lake Tahoe Hydrologic Unit.

Lahontan Basin Plan

The Water Quality Control Plan for the Lahontan Region (Basin Plan) sets forth water quality standards for surface and ground waters of the region. The Basin Plan identifies types of water quality problems that can threaten beneficial uses within the Region, and required or recommended control measures for those problems. The Lahontan Basin Plan was most recently updated in 1994.

Chapters 5.7 and 5.8 of the Water Quality Control Plan for the Lahontan Region (Basin Plan) describe Regional Board concerns regarding development in SEZs and floodplains. Chapters 5.7-7 and 5.8-7,8 specify findings which must be made before the Regional Board can grant exemptions to prohibitions against new development or permanent disturbance in SEZs or grant exceptions to the 100-year floodplain discharge prohibitions in cases where the floodplain is not also a SEZ. Proposed bikeway improvements discussed in this document that would impact SEZ or wetland areas would be subject to these regulations and permitting requirements.

U.S. Forest Service

Established in 1905, the U.S. Forest Service (USFS) is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in 155 national forests and 20 national grasslands. USFS lands encompass about 191 million acres, about 8.5 percent of the total land area of the United States. The Lake Tahoe Basin contains portions of three national forests: the El Dorado, Tahoe, and Toiyabe National Forests. The national forest lands in the Tahoe Basin are managed by the Lake Tahoe Basin Management Unit of the USFS. Much of the land along SR-89 within the project corridor is within the El Dorado National Forest.

California State Parks

The California Department of Parks and Recreation manages more than 260 park units, which contain the finest and most diverse collection of natural, cultural, and recreational resources to be found within California. California State Parks contains the largest and most diverse natural and cultural heritage holdings of any state agency in the nation. State park units include nearly 1.3 million acres, with over 280 miles of coastline; 625 miles of lake and river frontage; nearly 18,000 campsites; and 3,000 miles of hiking, biking, and equestrian trails.

Within the project area, major State Parks holdings include Emerald Bay State Park, D.L. Bliss State Park, and Sugar Pine Point State Park.

California Tahoe Conservancy

The California Tahoe Conservancy is an independent State agency within the Resources Agency of the State of California. It was established in its present form by State law in 1984. Its jurisdiction extends only to the California side of the Lake Tahoe Basin. The Conservancy is not a regulatory agency. It was established to develop and implement programs through acquisitions and site improvements to improve water quality in Lake Tahoe, preserve the scenic beauty and recreational opportunities of the region, provide public access, preserve wildlife habitat areas, and manage and restore lands to protect the natural environment.

Tahoe City Public Utility District

The Tahoe City Public Utility District (TCPUD) manages water, sewer and parks and recreation facilities in the Tahoe City area and along the west shore of Lake Tahoe. The TCPUD jurisdiction encompasses about 23 square miles, extending from the Nevada State line on the north shore around the west side of the Lake to the northern part of Emerald Bay. The TCPUD manages the Tahoe Trailways Bike Path system, approximately 15 miles of paved pathways extending out from Tahoe City.

Washoe Tribe

The Washoe Tribe of California and Nevada currently operates the Meeks Bay Resort and Marina, located on approximately 350 acres of land, on a 30-year lease from the USFS. This facility includes cabins, an RV campground, marina and boat launch, and a general store.

LAND USE

The project corridor is entirely within unincorporated El Dorado County. The nearest city to the project area is the City of South Lake Tahoe, located approximately four miles east of the Cascade area.

RESIDENTIAL COMMUNITIES

As noted above, the only incorporated community in the vicinity of the corridor is the City of South Lake Tahoe. However, a number of unincorporated communities are present along the west shore of the Lake.

Cascade Properties
The Cascade Properties neighborhood is a small private residential area located adjacent to Cascade Creek. Access is provided off of private Cascade Road and Sugar Pine Road, unpaved roads.

US Forest Service Summer Homes, Emerald Bay
Two small clusters of summer homes are located on USFS lands along the west side of Emerald Bay, one upslope of the highway and the other downslope. Access to these homes is provided via unpaved roads off SR-89, both located north of the top of the viaduct.

Rubicon Bay and Meeks Bay
The Rubicon Bay-Meeks Bay communities comprise a large residential area on the west shore. Rubicon Bay includes a small number of private homes located along 1 Ring, 2 Ring, 3 Ring and 4 Ring Roads, as well as the larger neighborhoods including Forest Drive, Sierra Drive, Victoria Drive, and on the west side of SR-89 Lower Scenic Drive, Silvertip Drive. The Meeks Bay community continues north from the Rubicon Bay neighborhood, along Meeks Bay Avenue. Another residential area is located on the west side of SR-89 off Glenwood Parkway.

RECREATIONAL AREAS

Much of the SR-89 corridor is bordered by public lands, including USFS National Forest lands and California State Park lands. These areas, along with private recreational facilities, provide numerous recreational opportunities.

Camp Richardson
The Camp Richardson area includes a number of recreational and historic uses on USFS land stretching between Pope Beach and Baldwin Beach. The Camp Richardson Resort and Marina, operated by a private concessionaire, is a year-round recreational destination that includes over 300 campsites, a historic hotel and lakefront cabins, a beachfront bar and restaurant, and a full-service marina. Other uses in the area include a USFS Visitor's Center, riding stables, and a Stream Profile chamber on Taylor Creek. The Tallac Historic site, Pope Estate, and Valhalla Estate are also located in the Camp Richardson area.

Fallen Leaf Lake

The Fallen Leaf Lake area is a popular recreational destination on the southwest shore. The Lake provides boating, fishing and swimming opportunities, and offers a starting point for trails leading into Desolation Wilderness. The Fallen Leaf Campground is a USFS campground at the north end of the lake, located south of SR-89 off of Fallen Leaf Lake Road. The campground provides over 200 campsites, and is open from May through October.

El Dorado National Forest

The El Dorado National Forest stretches from the Sierra foothills near Placerville to the southwestern portion of Lake Tahoe, encompassing approximately one million acres of land. The Forest is bordered by the Tahoe National Forest on the north, the Stanislaus National Forest on the south, and the Toiyabe National Forest on the east. Vegetation within the El Dorado National Forest include chaparral, conifer, fir, and subalpine communities, with elevations ranging from approximately 1,500 feet to over 10,000 feet. The El Dorado National Forest includes two wilderness areas: the 64,000-acre Desolation Wilderness in the southwest portion of the Tahoe Basin, and the 105,000-acre Mokelumne Wilderness south of Highway 88.

Emerald Bay State Park

Emerald Bay State Park is a 600-acre park located on the southwest shore of Lake Tahoe, about five miles from South Lake Tahoe. The Park includes the historic Vikingsholm mansion, considered one of the best examples of Scandinavian architecture in the western hemisphere and Fannette Island, the only island on Lake Tahoe. Hiking trails (including the Rubicon Trail), a public boat dock, and public beach access are available at Emerald Bay. Emerald Bay is a designated State Underwater Park, where divers can view artifacts from the boats and watercraft used on the Lake before the turn of the century.

Emerald Bay State Park includes a boat-in campground, on the north side of the Bay approximately one-half mile east of Fannette Island. The boat-in campground offers 20 campsites, and is open from Memorial Day through Labor Day. Camping is also available at Eagle Point campground, on the south side of the Bay, which has 100 campsites and is open from mid-June through Labor Day. Camping is also available at the Bayview Campground, located in USFS lands on the south side of SR-89, across from Inspiration Point.

Access to Emerald Bay State Park is provided off SR-89. Parking for day-use activities is available at three formal parking lots along SR-89: Inspiration Point, Eagle Falls, and Vikingsholm (Harvey West lot). The Eagle Point campground has its own access road extending north off the highway just before the moraine ridgeline.

D.L. Bliss State Park

D.L. Bliss State Park is a 1,200-acre park located immediately north of Emerald Bay State Park, on the western shore of Lake Tahoe. The Park stretches from Emerald Point to Rubicon Bay, and its recreational attractions include the Balancing Rock Nature Trail, the Rubicon Trail, and public beaches. The park includes 170 campsites, including beach camping at Lester Beach on Rubicon Bay. The Park is open from Memorial Day through Labor Day.

Access to D.L. Bliss State Park is provided off SR-89. The Park Headquarters is located at the main entrance road, approximately two miles north of the Vikingsholm parking area.

Meeks Bay

Meeks Bay campground is a USFS campground that is operated by California Land Management, a private concessionaire. The campground is located on the west shore of the lake, ten miles south of Tahoe City on SR-89. There are 40 developed sites at the Meeks Bay campground. The campground is open from mid-May through mid-September.

The Meeks Bay Resort and Marina features camping, a marina, a beach, and a general store, operated by the Washoe Tribe under permit from the USFS. The resort's campground includes 10 RV sites and 20 campsites, as well as lodging in cabins. The Meeks Bay Resort and Marina is located adjacent to the Forest Service campground along SR-89, on the north side of Meeks Creek.

Sugar Pine Point State Park

Sugar Pine Point State Park is a 2,000 acre park located just north of Meeks Bay on the west shore. With nearly two miles of lake frontage, the park has dense forests of pine, fir, aspen and juniper. Another attraction is the Hellman-Ehrman Mansion (also known as Pine Lodge), a summer home built in 1903 in a grove of pine and cedar. Recreational activities at the park include hiking, swimming, fishing, winter cross-country skiing, and a nature center. A short-term boat dock is located on the beach. Currently the West Shore bike path extending south from Tahoe City along SR-89 terminates within the boundaries of Sugar Pine Point State Park.

TRANSPORTATION AND CIRCULATION

TRAFFIC VOLUMES

Traffic volumes fluctuate tremendously on the project corridor, depending on the season. SR-89 through Emerald Bay is often closed during winter due to avalanche or rock slide hazards. Table 2-1 illustrates 2001 traffic volumes on SR-89.

Table 2-1
2001 Traffic Volumes on Project Corridor

		Southbound			Northbound		
Mile	**Description**	**Peak Hr.**	**Peak Mo.**	**AADT**	**Peak Hr.**	**Peak Mo.**	**AADT**
13.24	Spring Creek Road	680	6,300	3,600	580	5,000	4,000
19.54	D.L Bliss State Park	580	5,000	4,000	380	4,500	3,000
22.77	Rubicon Glen Drive	380	4,500	3,000	760	7,000	3,800

Notes:
Peak Hr. = Peak hour traffic volume.
Peak Mo. = Peak month ADT. The average daily traffic for the month of heaviest traffic flow
AADT = Annual average daily traffic volume. The total volume for the year divided by 365 days
Source: Caltrans

PUBLIC TRANSIT

Tahoe Area Regional Transit

The Tahoe Area Regional Transit (TART) system began service on the north shore of Lake Tahoe in 1975. The system is currently operated by Placer County and operates from 6:10 A.M. to 6:30 P.M., seven days a week. The service operates on State Routes 28 and 89 along the northern and western shores of Lake Tahoe, from Incline Village, Nevada on the northeast to Sugar Pine Point State Park in El Dorado County on the southwest, and to Truckee via State Route 89. Service is generally provided on hourly headways with a base fare of $1.25.

Tahoe Trolley

During the summer only, Tahoe Trolley provides service along the northern and western shores of Lake Tahoe along three coordinated routes; Crystal Bay-Tahoe City, Tahoe City-Squaw Valley and Tahoe City-Emerald Bay. Passengers can transfer between north/south segments and east/west segments. Trolleys operate from 10:30 A.M. until 10:30 P.M. seven days per week. Fares are equal to those of TART at $1.25.

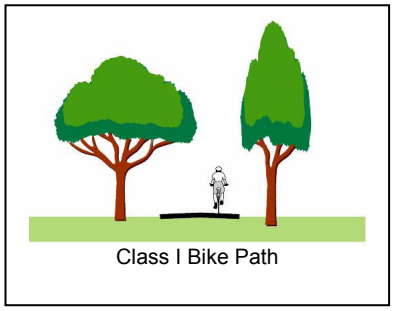
Nifty Fifty Trolley and Emerald Bay Tram

The Nifty Fifty Trolley was established in 1994 and currently operates two routes on the South Shore. Route A runs from Stateline to the South "Y" to Camp Richardson's Resort. Route B runs from Zephyr Cove to Stateline to Heavenly. In conjunction, during the summer season the Emerald Bay Tram runs every half-hour between Camp Richardson and Vikingsholm/Emerald Bay.

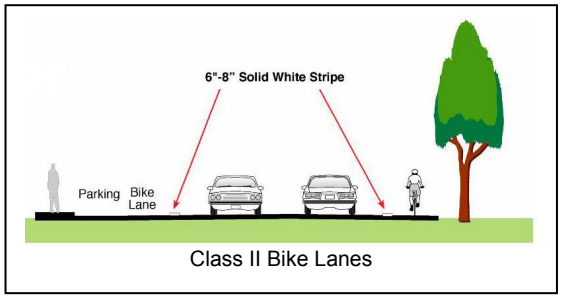
BIKEWAYS

Bikeway Classification Descriptions

The three types of bikeways identified by Caltrans in Chapter 1000 of the Highway Design Manual are as follows.


Class I Bike Path

Class I Bikeway. Typically called a “bike path” or “multi-use path” a Class I bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway. Class I bikeways are not for the exclusive use of bicyclists, and can also be used by pedestrians, joggers, and other non-motorized users.



Class II Bike Lanes

Class II Bikeway. Often referred to as a “bike lane,” a Class II bikeway provides a striped and stenciled lane for one-way travel on a street or highway.

Class III Bikeway. Generally referred to as a “bike route,” a Class III bikeway provides for shared use with pedestrian or motor vehicle traffic and is

identified only by signing.

One of the greatest divergences of opinion lies between those who feel paved bike paths, separated from roadways, should be constructed wherever physically possible, versus those who feel more comfortable riding on streets on lanes or routes. This preference is usually based on personal feeling regarding comfort and safety.

There are also people who argue whether Class II bike lanes are effective, or conversely, that bike lanes should be installed wherever possible. Bike lanes provide an additional buffer between traffic and sidewalks, aiding pedestrians. When properly designed, bike lanes help improve the visibility of bicyclists. On streets with low traffic volumes and speeds (under 5,000 vehicles per day average, 30 mph), bike lanes may not be needed at all. This is based on the potential for serious conflicts being so low that the cost of installing bike lanes is not warranted.

Existing Bikeways

Pope-Baldwin Bike Path

The 3.4-mile Pope-Baldwin Path is maintained by the USFS. This off-street path extends west from SR-89 near the South Lake Tahoe City limits and runs along the north side of the highway, ending at SR-89 at Spring Creek Road. The trail extends through Camp Richardson, and provides access to Pope, Kiva, and Baldwin Beaches and the Tallac Historic Site.

South Lake Tahoe Bike Path

This path is maintained by the City of South Lake Tahoe, and begins on the north side of Lake Tahoe Boulevard (US-50) near El Dorado Beach. The off-street path runs adjacent to US-50, crossing Trout Creek and the Truckee River, and ends on a residential street west of the Truckee River. Bike Route signage directs cyclists on street west and north through the neighborhood toward the Pope-Baldwin Path along SR-89.

West Shore Bike Path

The West Shore Bike Path is part of a network of bikeways maintained by the Tahoe City Public Utility District in the vicinity of Tahoe City. The 9-mile West Shore segment extends south from Tahoe City south along SR-89 to Sugar Pine Point State Park. The majority of this segment exists as a separate off-street path adjacent to the highway, requiring some uncontrolled highway crossings where the path switches between the east and west sides of the roadway. Some short sections require riding on the highway shoulder or detouring onto residential streets. The TCPUD currently has plans to extend the West Short Path from Sugar Pine Point to Meeks Bay.

INTERSECTIONS

Intersections and side roads along the SR-89 project corridor are described briefly below.

Spring Creek Road

Spring Creek Road provides access to the Spring Creek USFS summer home tract. This road is paved at its junction with SR-89.

Cascade Road/Sugar Pine Road

Cascade Road and Sugar Pine Road are both private roads providing access to the Cascade Properties residential area downslope of the highway. Cascade Road is a loop road that intersects the highway in two locations. The southern junction of Cascade Road/SR-89 is north of Spring Creek, and the northern junction is south of Cascade Creek. Spring Creek Road extends off Cascade Road and intersects SR-89 just south of the northern Cascade Road junction. Both roads were paved in 2002.

Eagle Point Campground

The access road to Eagle Point campground is a paved State Parks road, open from approximately mid-June through Labor Day. This road extends north off SR-89 just east of the double switchback area. Currently use of this road is limited only to those staying at the campground; day use parking is not permitted.

Inspiration Point Parking Lot

The Inspiration Point parking lot is located on the north side of SR-89, overlooking the southern end of Emerald Bay. This lot provides 21 parking spaces, and is open from about Memorial Day through Labor Day.

Bayview Campground and Trailhead

The road to the Bayview campground and trailhead extends south off SR-89, directly across from the Inspiration Point parking lot. Unpaved areas adjacent to this road junction are used as overflow parking for the Inspiration Point area, and provide about 25 informal parking spaces.

Eagle Falls Trailhead

The road to the Eagle Falls trailhead extends west of SR-89 just north of the Eagle Falls bridge. This road leads to a paid parking area adjacent to the Eagle Falls trailhead, which provides access into Desolation Wilderness. North of the trailhead road, on the southbound side of SR-89, is an informal paved parking area, used mostly by visitors to the lower Eagle Falls area, which provides about 28 spaces.

Vikingsholm Parking Lot

The Vikingsholm parking area (Harvey West Lot) is located on the east side of SR-89 just north of Eagle Falls. This is the primary parking area for visitors hiking down to the Vikingsholm mansion. This lot provides 64 formal marked parking spaces, and about 11 informal spaces.

USFS Summer Home Tract (West Side)

An unpaved road on the west side of SR-89 at the top of the viaduct provides access to a group of summer homes on USFS land upslope of the highway.

USFS Summer Home Tract (East Side)

An unpaved, gated road on the east side of SR-89, north of the top of the viaduct, provides access to a group of summer homes on USFS land downslope of the highway.

Emerald Bay State Park Service Road
A paved, gated service road on the east side of SR-89 near the northern boundary of Emerald Bay State Park is used for Park vehicle access. This roadway drops steeply down to the Boat Campground, then continues to Vikingsholm where it connects to the unpaved road leading up to the Vikingsholm parking area.

D.L Bliss State Park Main Entrance
The public entrance to D.L. Bliss State Park is located on the east side of SR-89, and is also known as Lester Beach Road. This paved road goes past the entrance station and visitor center, winds down through the park campgrounds, and terminates at the Lester Beach camping area near Rubicon Point.

D.L. Bliss State Park Service Road
A State Parks service road for D.L. Bliss State Park is located just before the northern Park boundary. This gated, paved road extends east off SR-89, and intersects the main park entrance road near an area of Park staff housing.

Paradise Flat Private Roads
Four parallel private roads in the Paradise Flat area – 1 Ring, 2 Ring, 3 Ring, and 4 Ring – provide access to residences in the south part of Rubicon Bay. These roads are identified by the white bands around the trees at their junctions with the highway. These roads are paved at their junctions with SR-89, but generally unpaved elsewhere.

Rubicon Bay Roads, East Side
Residential streets within the Rubicon Bay community that intersect the east side of SR-89 include Rubicon Drive, View Circle, Sierra Drive, Amanda Lane, and Victoria Drive. These roads provide access to the residential homes located downslope of the highway along Rubicon Bay.

Rubicon Bay Roads, West Side
Residential streets within the Rubicon Bay community that intersect the west side of SR-89 include Scenic Drive, Glen Drive, Mountain Drive, and Silvertip Drive. These roads provide access to residential homes located upslope of the highway.

Meeks Bay Roads
The Meeks Bay residential community extends north from the Rubicon Bay residential area. On the east side of the roadway, most homes are located along Meeks Bay Avenue, which generally parallels SR-89 just downslope of the highway (and at its southern end connects to Victoria Drive within Rubicon Bay). On the west side of the highway, access from SR-89 to a network of residential streets is provided via Valley View Drive.

Meeks Bay Campground
The USFS Meeks Bay campground entrance road is located on the east side of SR-89, just south of Meeks Creek.

Meeks Bay Resort and Marina
The entrance road to Meeks Bay Resort and Marina is located on the north side of Meeks Creek. This roadway provides access to the Meeks Bay RV park, cabins, general store, and boat launch/marina.

NATURAL RESOURCES

WATERWAYS

The SR-89 Cascade to Rubicon Bay corridor crosses several waterways. Each crossing of a major waterway (those shown as blueline streams on the USGS topographic map) is discussed below.

Tallac Creek
Tallac Creek crosses the roadway just after it turns north after Spring Creek Road. After crossing beneath SR-89, Tallac Creek extends through a marsh area before entering Lake Tahoe at Baldwin Beach.

Cascade Creek
Cascade Creek drains from Cascade Lake into Lake Tahoe just north of the Cascade Properties residential area. Cascade Creek crosses beneath SR-89 at a bridge just east of the first switchback.

Eagle Creek
Eagle Creek drains from Eagle Lake into the western end of Emerald Bay near Vikingsholm. This creek crosses beneath SR-89 at a stone bridge and drops to the Lake in a dramatic waterfall, Eagle Falls.

Vikingsholm Area Drainages
Just north of the Vikingsholm parking area, a series of unnamed drainages flow off the steep western slopes and drop down into Emerald Bay. These drainages pass beneath the SR-89 viaduct.

Rubicon Creek
Rubicon Creek and several unnamed tributaries flow beneath SR-89 and join near the northern boundary of D.L. Bliss State Park. The creek enters Lake Tahoe just north of Lester Beach.

Paradise Flat Drainage
An unnamed blueline stream crosses beneath SR-89 just south of 3 Ring Road and enters Lake Tahoe at Paradise Flat.

Rubicon Bay Drainages
Two blueline streams extend through the Rubicon Bay community. The southern drainage is identified as Lonely Gulch, and extends from a reservoir upslope of SR-89, crosses the highway south of Glen Drive, and enters Lake Tahoe east of Winston Circle. The second drainage is unnamed and crosses beneath SR-89 at the eastward curve north of Sierra Drive, then enters Lake Tahoe near Beach Lane.

Meeks Creek

Meeks Creek passes beneath SR-89 between the USFS campground and the Resort and Marina facilities. A boat marina and a narrow inlet channel have been developed at the mouth of the creek, operated by the Washoe Tribe under permit from the USFS.

TYPICAL ROADWAY CORRIDOR CHARACTERISTICS

For purposes of the Bikeway Study, the SR-89 roadway corridor has been broken down into four segments, with each segment defined by relatively distinct physical and environmental characteristics. **Figure 2-3, Corridor Segment Key**, illustrates the limits of each study segment. By separating the study corridor into several independent segments, the unique opportunities and constraints of each can be isolated and addressed. The roadway is described from south to north, beginning at Spring Creek Road (milepost 13.24) and ending at Meeks Bay. Although the road curves westward around Emerald Bay, travel lanes are referred to as either northbound or southbound to reflect the overall highway alignment.

The four study area segments are:

- Segment 1: Spring Creek Road to Cascade Creek
- Segment 2: Cascade Creek to D.L. Bliss State Park Boundary
- Segment 3: D.L. Bliss State Park Boundary to Paradise Flat
- Segment 4: Paradise Flat to Meeks Bay

It should be noted that this section generally describes conditions along only the highway corridor. Conditions in areas away from the roadway, such as the natural habitat areas within Emerald Bay State Park, are described in detail in chapter 3 as part of the evaluation of conceptual alternatives.

SEGMENT 1: SPRING CREEK ROAD TO CASCADE CREEK

Segment 1, Spring Creek Road to Cascade Creek, reflects a transition from the flat, wooded area along the south shore of the Lake up toward the steep exposed slopes of the moraine between Emerald Bay and Cascade Lake. This segment of highway crosses two waterways, Spring Creek and Cascade Creek, and passes by the Cascade Properties residential neighborhood. The roadway begins at an elevation of approximately 6,300 feet.

Throughout Segment 1, the roadway is approximately 24 to 25 feet in width. Travel lanes are 11.5 feet in width.

Near Spring Creek, a 2-foot shoulder is present on the northbound side of the roadway, with virtually no shoulder (6 inches paved outside the edge line) on the southbound side. North of Spring Creek, the road begins gently rising. The roadway is on a slight cross-slope, with the southbound lane abutting a small dirt berm.

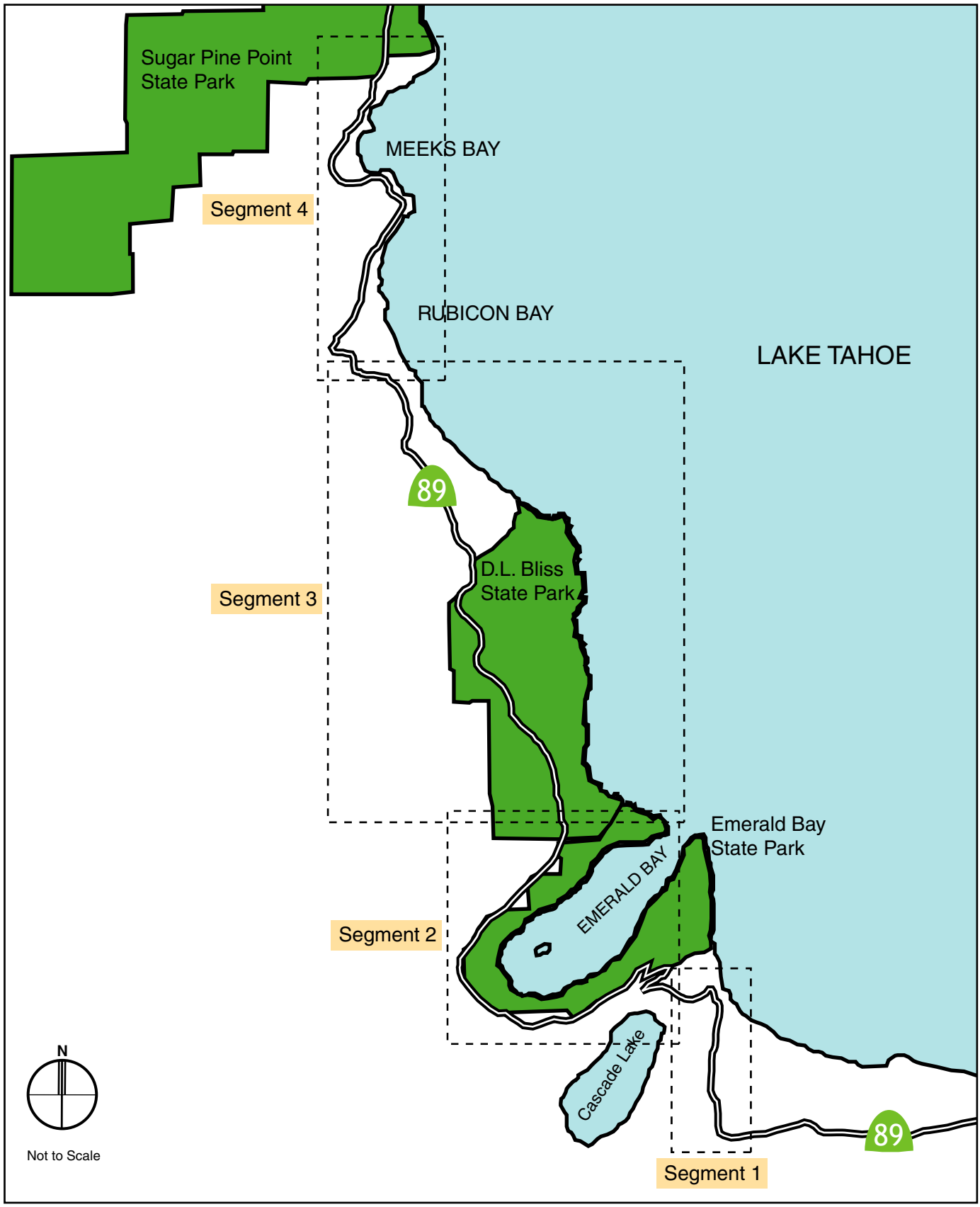


Figure 2-3
Corridor Segment Key

Cascade Road (southern terminus) extends off of SR-89 in a shallow "Y", with Cascade Road dropping down toward the Lake, and SR-89 rising climbing up. At Cascade Road, the roadway is at an elevation of approximately 6,375 feet. At this point, the roadway is on a steep cross-slope, with a steep downslope from the northbound lane. The northbound lane has approximately 6 inches of pavement outside the edge line, followed by 2 to 4 feet of gravel before a steep drop off. The southbound lane in this area has approximately 1 foot of paved shoulder, abutting a curb that is present against the upslope.

Nearing the top of the uphill straightaway above Cascade Road, the roadway curves slightly west, continues up, then makes a sharp westerly curve at the top of the hill. At each of the two curves, the northbound lane widens into a pullout, and guardrails are present along the northbound side. Due to the steep easterly drop-off, expansive views of the Lake are available from this section, and vehicles were observed parking in the pullouts to view the lake and take pictures. Throughout this area, a concrete retaining wall is present along the southbound lane, which abuts the slope. At the first pullout, the roadway is 38 feet at its widest point, with 12 foot travel lanes, a 10 foot northbound pullout, and a 4 foot southbound shoulder (between the edge line and retaining wall). At the second pullout, the road is 50 feet at its widest point, with a 20 foot northbound pullout, a 14 foot northbound travel lane, a 12 foot southbound travel lane, and a 4 foot southbound shoulder. The roadway reaches an elevation of about 6,440 feet near the second pullout.

From the second pullout to Cascade Creek, the roadway grade flattens out. Between the guardrail and Sugar Pine Road, there is 4 to 5 feet of shoulder on both sides of the road. After Sugar Pine Road, the roadway narrows again, providing only 6 to 12 inches of pavement outside the edge line in both directions.

The roadway widens slightly at the Cascade Creek crossing, with 11.5 foot travel lanes and 5 foot shoulders on both sides. A guardrail is present on both sides of this bridge.

SEGMENT 2: CASCADE CREEK TO D.L. BLISS STATE PARK BOUNDARY

Segment 2, Cascade Creek to D.L. Bliss State Park Boundary, is characterized by steep uphill and downhill segments around Emerald Bay. Heading north from Cascade Creek the highway begins a steep uphill grade, with exposed slopes, switchbacks and a section of roadway along the "razorback" ridge of the moraine. North of Inspiration Point, the highway is characterized by a long downhill section high above the western end of Emerald Bay, with expansive views over the water to the northeast. The roadway in this area drops sharply down toward the Lake, and long sections of guardrail exist.

Topography in this section, particularly on the switchbacks, is such that even skilled cyclists may find it challenging to ride. Uphill cyclists will be climbing slowly, and the steep inside corners of the switchbacks may require brief out-of-the-saddle efforts. Downhill cyclists will be traveling fast and frequently braking in order to maintain control down the steep switchbacks.

Following the Cascade Creek crossing, the road leaves the forest and begins to head up along the base of the Cascade Lake moraine. The first switchback is at Tahoe Mile 51 sign. The roadway is 44

feet wide at the apex of the curve. Despite the width, shoulders are not well defined on either side of the road, and vehicles were observed cutting close to the inside of the switchback.

After the switchback, the road begins a long uphill straightaway up the side of the moraine. The road is constructed into a steep cross-slope, with a retaining wall present along the southbound lane, and steep drop-off from the northbound lane. The roadway is approximately 25 feet wide, from the edge of the retaining wall to the edge of the drop-off. This includes a 12 foot northbound lane, and 11 foot southbound lane, and about 1 foot outside the edge line on both sides.

The second switchback is approximately 60 feet at the apex, with a 23 foot southbound lane, a 20 foot northbound lane, and a 17 foot pullout. This switchback is located at an elevation of about 6,600 feet.

North of the second switchback, the road flattens out briefly, passing the entrance road to Eagle Point campground, then rises steeply up toward the double switchback. As with the first switchbacks, climbing up the double switchback will likely have cyclists standing out of the saddle to power up the steep corners. Downhill cyclists will be braking frequently and will need to watch for loose sand and gravel in the tight corners. Heading northbound from the double switchback, a final steep uphill pitch brings a cyclist to the top of the "razorback" ridge. From the two 10 foot roadway lanes, the road drops off steeply on both sides, with views of Emerald Bay to the north and of Cascade Lake to the south. Due to lack of shoulder and steep drop-off, cyclists will tend to ride well away from the edge of the road in this segment, and it is necessary for vehicles to cross the centerline when passing.

At Inspiration Point, the roadway flattens out and widens. Traffic is heavy and there are frequent turning movements associated with parking areas on both sides of the roadway. North of Inspiration Point, the roadway begins a sustained descent toward Vikingsholm. Traffic is heavy in the vicinity of Eagle Falls and Vikingsholm, and the potential for bicyclist conflicts with vehicles high is due to the number of cars pulling into informal pull-outs on the Lake side of the road.

Downhill grades are sufficient in this area, and the road straight enough, that skilled downhill bicyclists will be coasting at close to the speed of traffic and will tend to venture out into the lane. During peak visitor hours, vehicles can be observed parking almost any available shoulder area in order to take pictures or observe the panoramic view of Emerald Bay. This increases the likelihood that downhill cyclists will take the lane in order to stay clear of vehicles parked in the shoulder. Uphill cyclists will generally be climbing much slower than the speed of traffic, and frequent rocks and gravel along the uphill shoulder may require them to swerve out into the lane momentarily.

Heading north from Vikingsholm, cyclists start immediately climbing the viaduct section of the highway. Shoulders in this area are approximately 2 to 4 feet wide, although the fact that the shoulder abuts a solid concrete wall on either side of the roadway limits their effective width for use by cyclists.

In the uphill direction, cyclists will tend to move as far to the right as possible, but due to the guardrail and sand/gravel in the shoulder will likely be on or inside the edge line. Skilled cyclists

descending the viaduct section will tend to take the lane, as they will be traveling at the speed of traffic.

SEGMENT 3: D.L. BLISS STATE PARK BOUNDARY TO PARADISE FLAT

From the top of the viaduct, the roadway enters a stretch of rolling hills as it exits Emerald Bay State Park and enters the D.L. Bliss State Park boundary. The roadway is within the forest at this point, and views of the Lake are generally not available. Two roadways extend off the east side of the highway. The first provides access to a group of summer homes on USFS land on the east side of the highway. The second is the Emerald Bay State Park service road, a paved road that drops steeply down the slope to the Boat Campground, then continues toward Vikingsholm, connecting to the unpaved road that leads up to the Vikingsholm parking lot.

Just after the Emerald Bay S.P. service road, SR-89 enters the boundary of D.L. Bliss State Park. Public access to D.L. Bliss State Park is provided at the main park entrance on the east side of the highway. This road, known as Lester Beach Road, drops steeply down through the campsites of the Park, and out toward the beach campground at Rubicon Point.

The D.L. Bliss State Park service road is located near the northern boundary of the Park. This paved road extends east from the highway and connects to the main Park road near a staff housing area. This roadway is gated and signed for "Official Vehicles Only," but the gate was observed to be frequently open.

From the northern boundary of D.L. Bliss State Park, the roadway drops down to the Paradise Flat area, an expanse of forest and meadow in the southern part of Rubicon Bay. The highway is up to one-half mile inland at this point, and the topography is relatively flat and at one of the lowest points along the alignment (6,260 feet). Paradise Flat is the location of four parallel private roads that provide access to residences along the bay. These roads – 1 Ring, 2 Ring, 3 Ring, and 4 Ring Roads – are identified by white bands around trees near their entrances.

SEGMENT 4: PARADISE FLAT TO MEEKS BAY

From Paradise Flat, the highway begins to climb again toward the community of Rubicon Bay. In this segment the highway curves westward around the Rubicon Bay residential area. The Rubicon Bay residential area is characterized by a network of residential streets downslope of the highway, with several access points from the highway. While these streets may provide an opportunity for cyclists to detour off the main highway, the appeal of such a route may be limited by the curving nature of the roadways, the numerous intersections, and the frequent topography changes as the roads roll along the side of the hill. Along the northern portion of Rubicon Bay, a long residential street closely follows the alignment of SR-89, exiting to the highway at the northern tip of the Bay.

In the central part of Rubicon Bay, the roadway curves westward, around the residential area, before curving back eastward. Along the northern part of Rubicon Bay, the roadway is relatively straight. In this area, a single parallel residential roadway is located downslope of the highway. This roadway could provide some opportunities for cyclists to detour off the highway, as it is straight and does not involve a major elevation change to get to and from the highway.

The Meeks Bay residential community is concentrated around the point just south of Meeks Bay. The roadway curves west in this area, then descends down to the Meeks Bay campground area. The Meeks Bay campground is owned by the USFS. Adjacent to the campground is the Meeks Bay Resort and Marina, operated by the Washoe Tribe. This is the only sheltered marina along the study corridor.

OPPORTUNITIES AND CONSTRAINTS

Based on the information compiled during the existing conditions analysis, a set of Opportunities and Constraints maps were developed for the study area illustrating key characteristics of the corridor that may affect the development of a bikeway. These maps are shown in **Figures 2-4, 2-5, 2-6, and 2-7**.

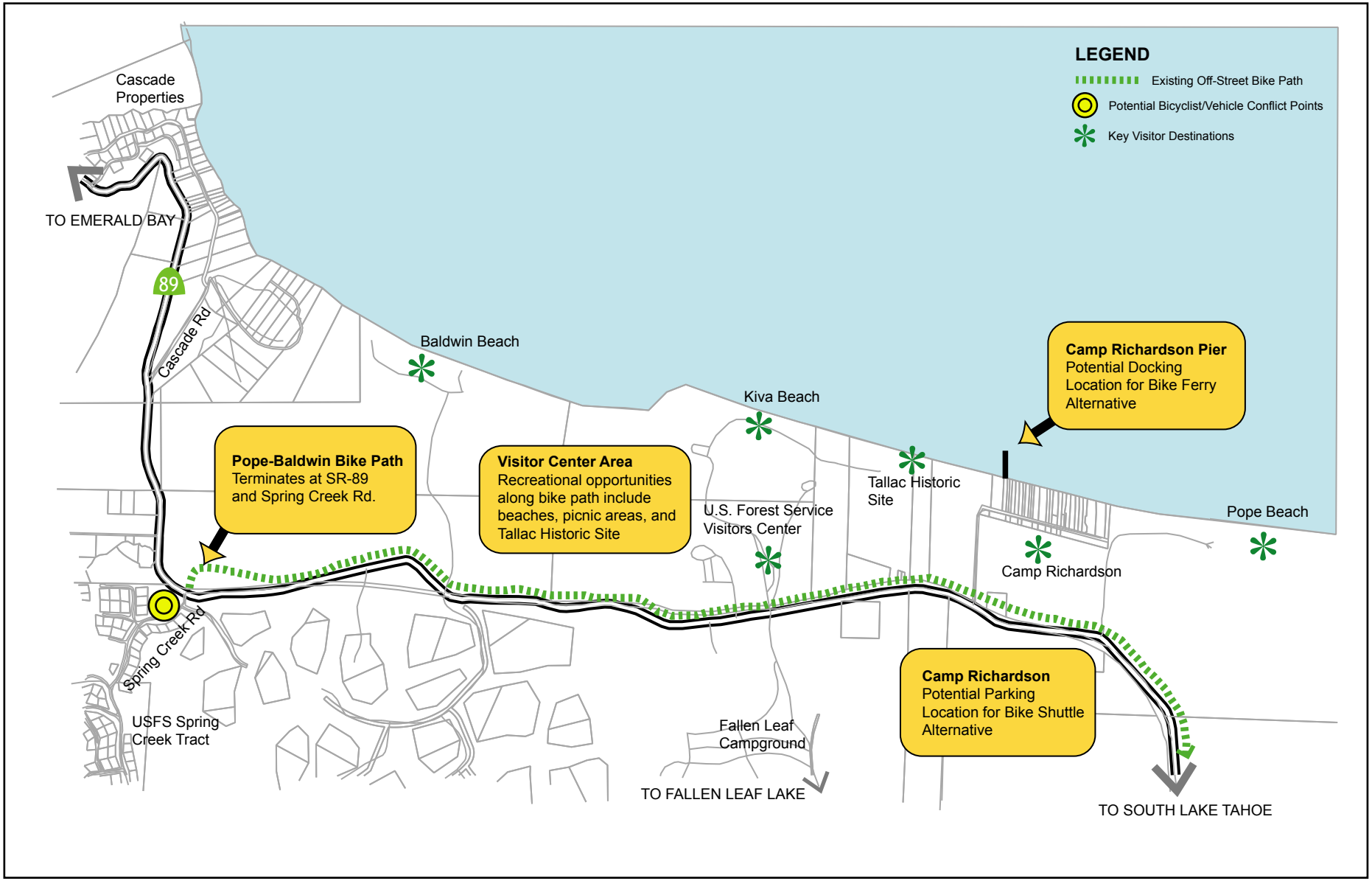


Figure 2-4
Opportunities and Constraints: Segment 1

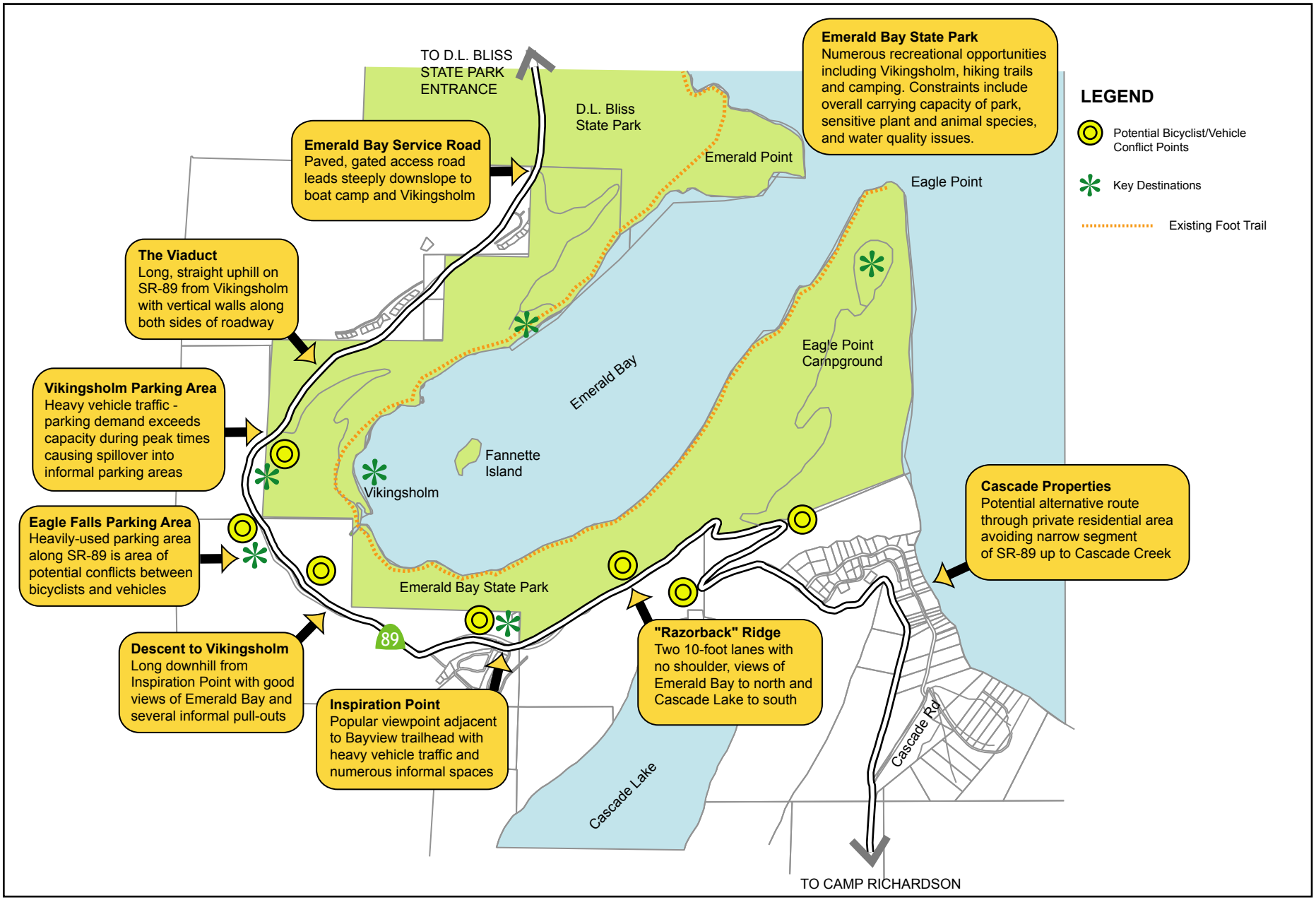


Figure 2-5
Opportunities and Constraints: Segment 2

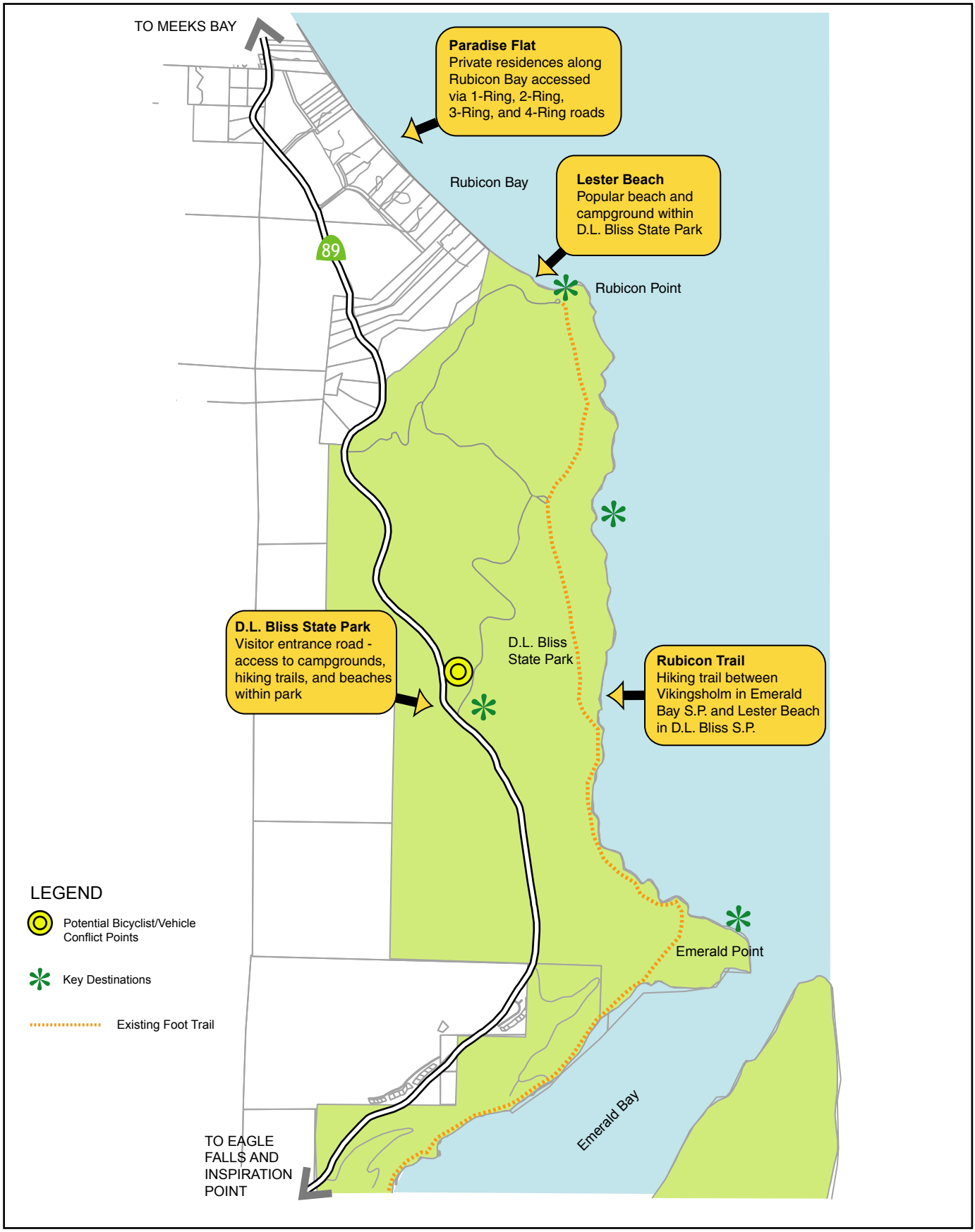


Figure 2-6
Opportunities and Constraints: Segment 3

alta PLANNING + DESIGN

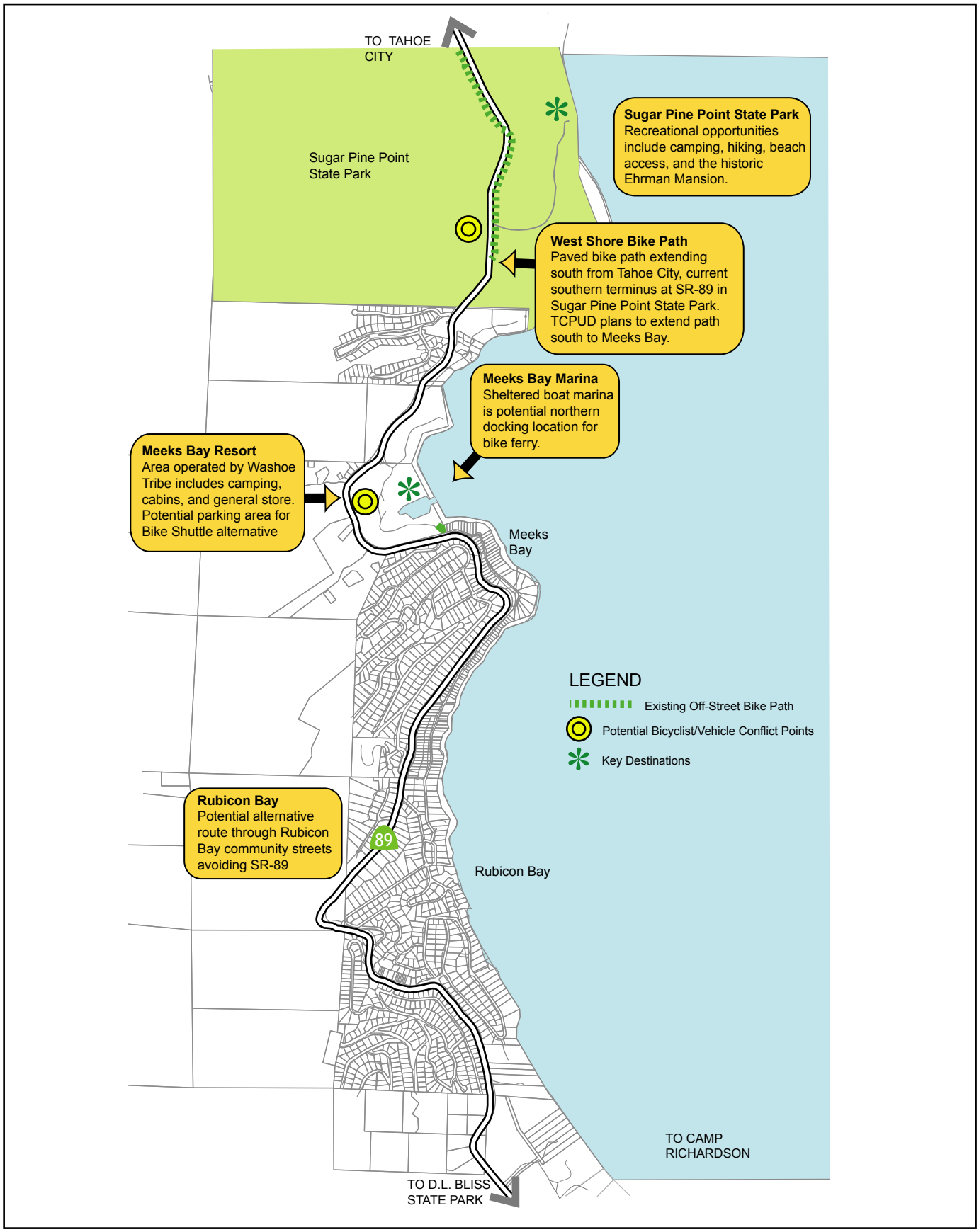


Figure 2-7
Opportunities and Constraints: Segment 4

3. CONCEPTUAL BIKEWAY ALTERNATIVES

Five conceptual alternatives were identified for detailed analysis as part of this Bikeway Study, based on initial field visits, preliminary environmental and engineering information, Technical Advisory Committee meetings, the public workshops on the North and South Shores, and discussions with agency staff. These alternatives included:

- Alternative 1: Off-Street Bikeway
- Alternative 2: On-Street Bikeway
- Alternative 3: Transit
- Alternative 4: Water Ferry
- Alternative 5: Scheduled Road Closure

For each of the conceptual bikeway alternatives, an appropriate "first cut" analysis was conducted. These analyses were not comprehensive, but instead intended to provide an overview of the alternative, to identify any "fatal flaws" with each alternative, and to note any further steps that would be necessary. The type of analysis was dependent upon the alternative; for example, Alternative 1 (off-street bikeway) focused on engineering and natural resource impacts, while Alternative 5 (road closure) focused on potential operational issues.

The conceptual alternatives discussed in this chapter are illustrated on the maps shown in **Figures 3-1, 3-2, 3-3, and 3-4** on the following pages.

ALTERNATIVE 1: OFF-STREET BIKEWAY

OVERVIEW OF ALTERNATIVE

The analysis of Alternative 1 was conducted to determine in what segments of the Cascade to Rubicon Bay corridor it could be possible to construct an off-street bike path. For purposes of the environmental analysis, it was assumed that an 8-foot wide paved bike path was being considered. It was assumed that the path would be routed near the shoreline (as opposed to following the highway), in order to provide a bike path alignment with minimal topographic change that could be ridden by casual recreational cyclists. In areas of the corridor where private homes abut the shoreline, it was assumed that the bikeway would utilize an on-street route. Within Emerald Bay and D.L. Bliss State Parks, the off-street bikeway route would roughly follow an existing hiking trail around the east side of Emerald Bay and the Rubicon Trail from Vikingsholm northward to Lester Beach. The general route of the off-street bikeway studied under Alternative 1 is shown on the Conceptual Alternatives maps.

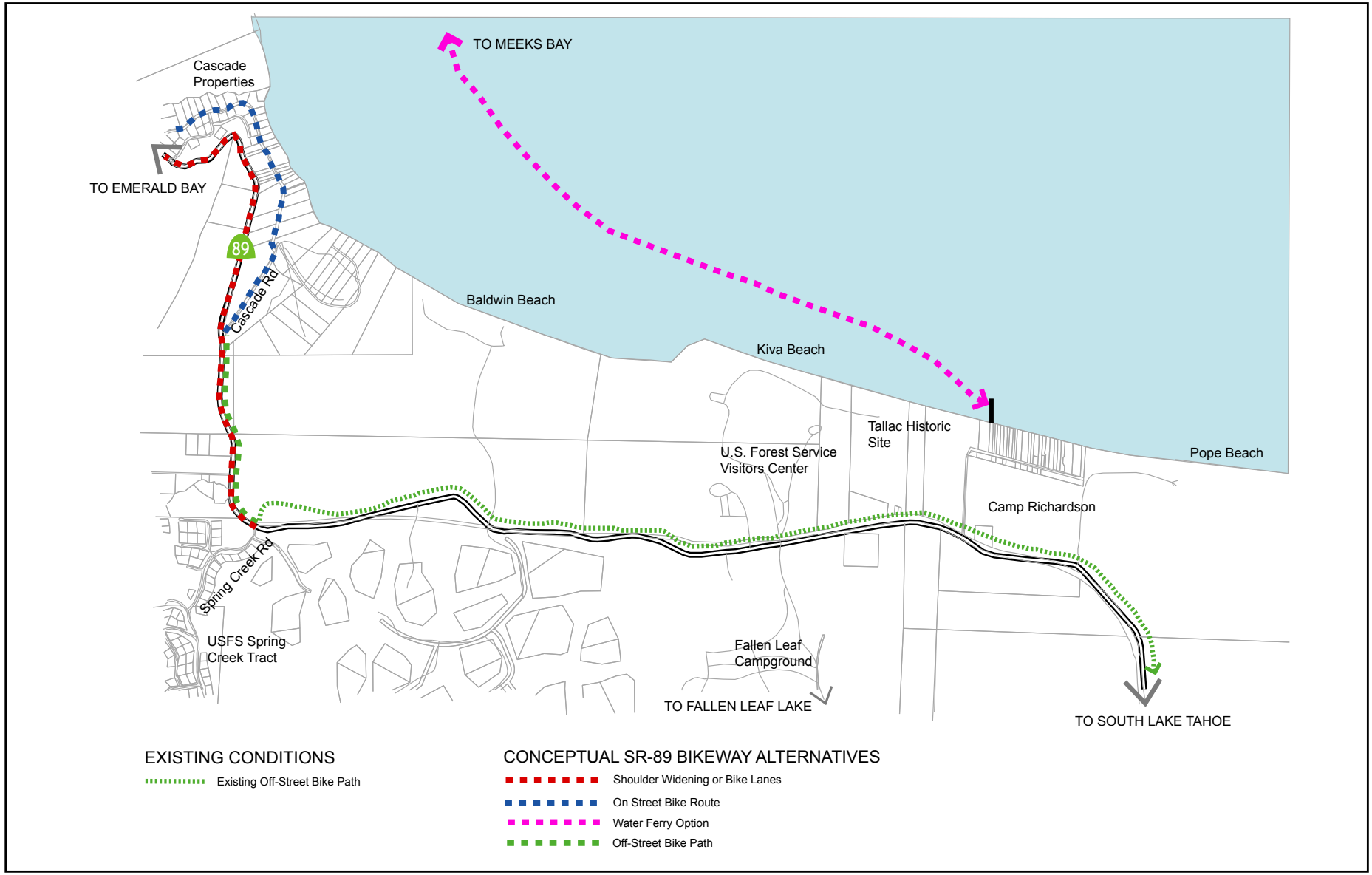


Figure 3-1
Conceptual Bikeway Alternatives: Segment 1

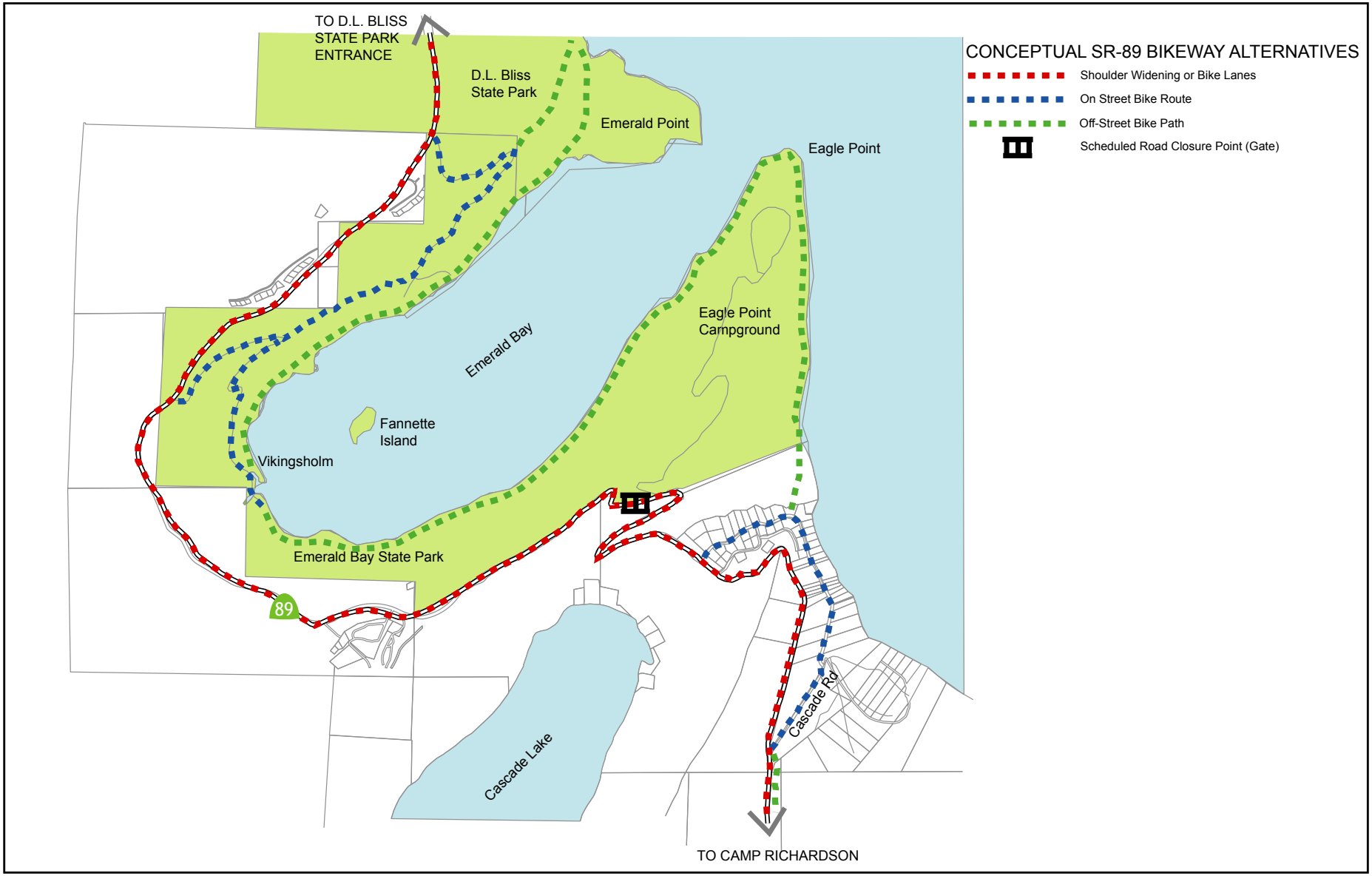


Figure 3-2
Conceptual Bikeway Alternatives: Segment 2

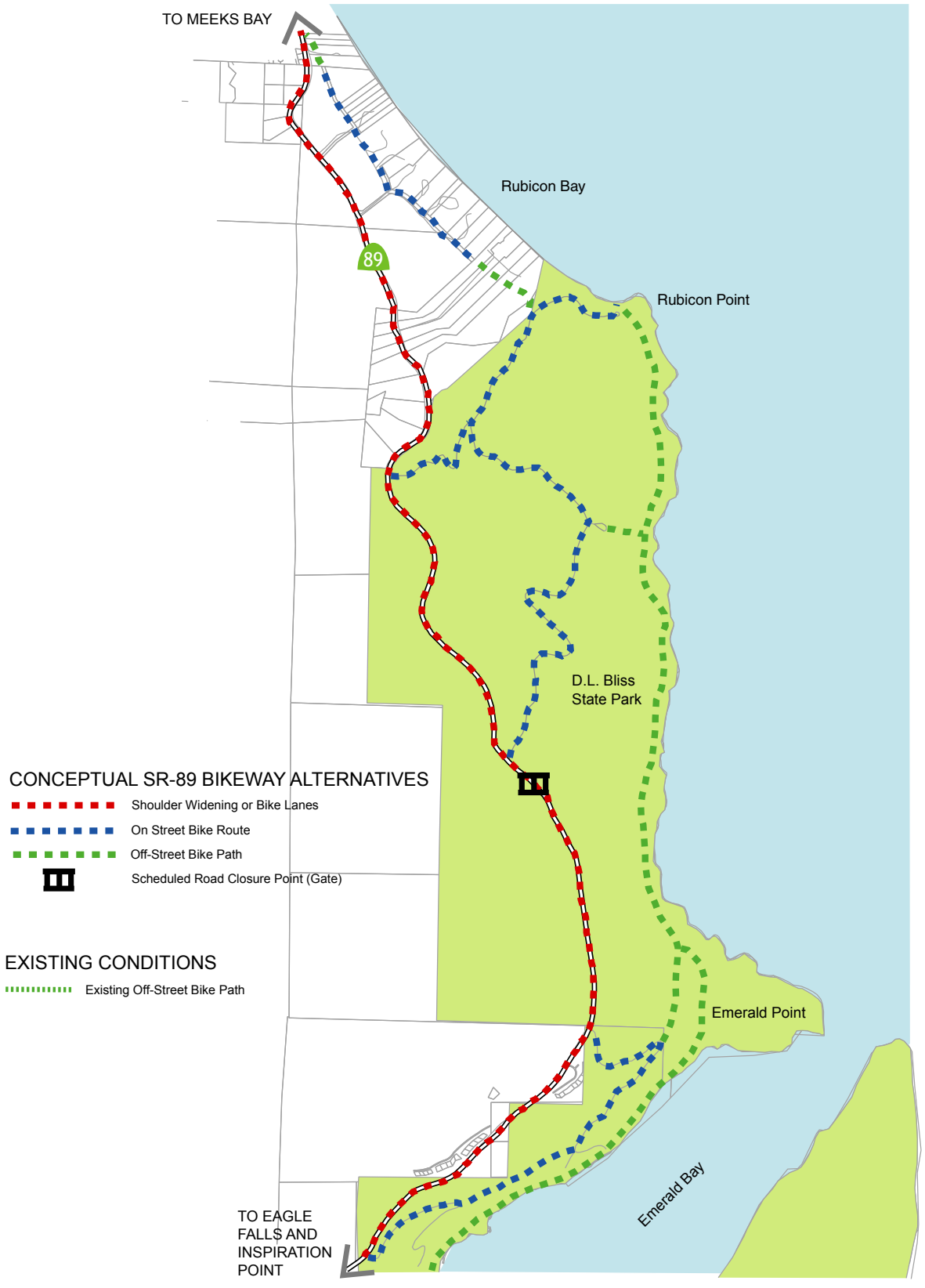


Figure 3-3
Conceptual Bikeway Alternatives: Segment 3

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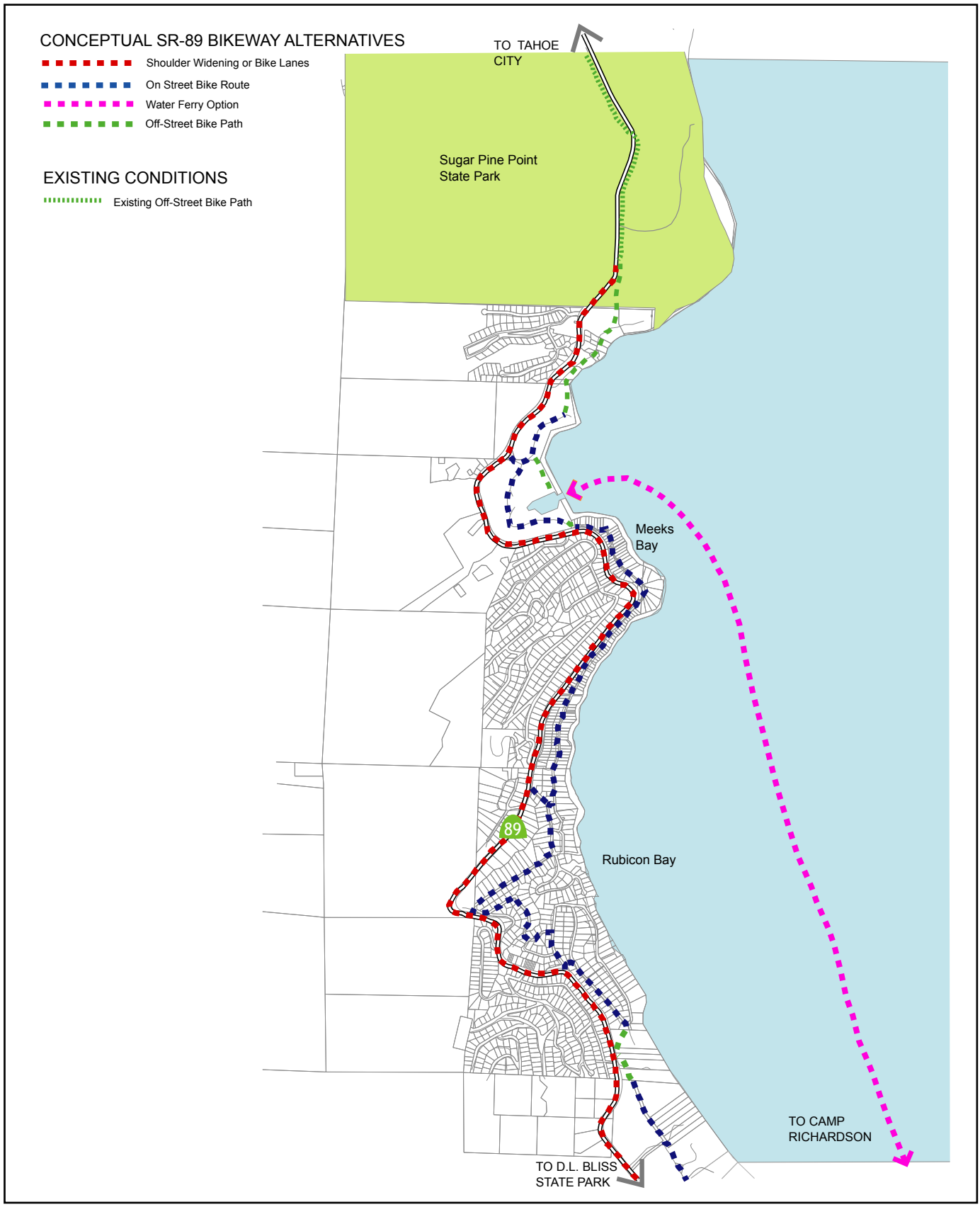

Figure 3-4
Conceptual Bikeway Alternatives: Segment 4

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ENVIRONMENTAL CONSIDERATIONS

The environmental analysis of Alternative 1 focused on the major issues associated with developing an off-street paved bike path through the undeveloped areas between Spring Creek Road and Meeks Bay. It should be noted that a detailed bike path alignment was not analyzed, nor were focused field surveys conducted. Rather, a general "corridor-level" analysis was conducted in order to identify the major impacts for each technical sub-area. The environmental topics evaluated for Alternative 1 included:

- Wildlife;
- Vegetation;
- Geology, Soils and Erosion;
- Cultural Resources; and
- Visual Quality

This section contains a summary of the major technical analysis conducted for each environmental topic. A copy of the full technical report for each topic is included in the appendix to this Bikeway Study.

WILDLIFE

Background

The TRPA Goals and Policies provide for maintenance of suitable wildlife habitats for all game and non-game indigenous species by maintaining and increasing habitat diversity. Habitats essential for threatened, endangered, or sensitive (TES) wildlife species must be preserved and enhanced. The Goals and Policies also reinforce the provisions of state and federal protection for TES wildlife species.

Aquatic habitats essential for growth, reproduction, and perpetuation of the fishery resource shall be improved by prohibiting actions that will degrade the resource and encourage actions to enhance it. Stream habitat is protected from physical alteration, such as artificial modification to stream channels, unless TRPA finds that such actions avoid significant adverse impacts to the fishery or are otherwise allowed under the Code.

Development proposals affecting streams, lakes and adjacent lands must evaluate impacts to the fishery. No project or activity shall be undertaken within the boundaries of a stream environment zone except as otherwise permitted for habitat improvement, dispersed recreation, vegetation management, or as provided in Chapter 20.

Stream environment zones adjoining creeks and major drainages that link islands of habitat and shall be managed, in part, for use by wildlife as movement corridors. Structures proposed within these

movement corridors shall be designed so they do not impede the movement of wildlife. Riparian vegetation shall be protected and managed for wildlife.

Potential Impacts

Bald eagle – TRPA species of special interest, USFS sensitive species, USFWS species of concern
The alignment through D.L. Bliss State Park is an area where it might not be possible to construct due to wildlife issues, specifically nesting raptors. A pair of bald eagles (*Haliaeetus leucocephalus*) nest in the Emerald Point area of D.L. Bliss State Park. This pair has successfully fledged young for the past few years. Mapped bald eagle Threshold habitat is located in the northeastern portion of Emerald Bay. Bald eagle management zone and winter habitat is mapped in the Baldwin Beach/Tallac Creek area. The trail alignment traverses to the west of the latter two mapped habitat types, it does not pass through the habitat types.

Osprey – TRPA species of special interest
Approximately fifteen pairs of ospreys (*Pandion haliaetus*) nest along Lake Tahoe's shore in Bliss State Park. The number of pairs successfully fledging young each year varies, but is typically only two to three. Ospreys typically begin their nesting activities in March when the park is still covered with snow. Once summer use of the park begins, the nesting ospreys are exposed to disturbances due to visitor use of the trail that parallels Lake Tahoe. Nest trees are not limiting, but the ospreys most likely place their nests in close proximity to this trail because no human use occurs during their nest building activity. The subsequent visitor use of the trails causes disturbance to the nesting ospreys that might account for recorded nest failures. The California State Park's wildlife biologist is conducting a study to assess the effects of recreation on the nesting ospreys in the park.

It is reasonably assumed by wildlife managers that if special status species nest in close proximity to existing development they have adapted to such conditions. (Exceptions can occur when species build nests during winter in areas of low human use, but these areas later receive high recreational use in summer.)

Birds are particularly vulnerable to disturbance when they are breeding. Adults might abandon eggs as well as early hatchlings, which can lead to total reproductive failure (White and Thurow 1985), and subsequent abandonment of the territory may occur (White and Thurow 1985). Recreational activity can cause nesting adults to fly off or alter their attentiveness, thus increasing the risk of the eggs or young being preyed upon, disrupting feeding patterns, or exposing the young to adverse environmental stress (Burger 1995; Hammitt and Cole 1998). Juveniles forced to fledge prematurely due to disturbances might be more vulnerable to weather and predators.

Impacts to wildlife and their habitat are typically less significant when new uses occur on existing trails and roads. However, even if the bike path follows the existing footpath, TRPA is likely to consider the bike path a new use. Thus, the project would be subject to the buffer zones (osprey: ¼ mile radius; bald eagle: ½ mile radius) around active nest sites and limited operating periods (LOPs) from March 15 to September 1. Implementation of these LOPs and buffer zones would prevent development and use of the bike trail during those times.

Pine Marten – USFS sensitive species

Pine martens (*Martes americana*) have been recorded in the forested portions of Bliss State Park (north of Emerald Point) north to the Meeks Bay Resort and Marina. No LOPs or buffer zones are required by TRPA for martens. However, the Sierra Nevada Framework (USFS) mandates a protected activity center (PAC) of 100 acres of the highest quality habitat surrounding den sites, arranged in as compact a unit as possible. A limited operating period around den sites applies from May 1 through July 31. No den sites are currently known.

Willow Flycatchers – California Threatened, USFWS species of concern, USFS sensitive species

No occupied habitat or willow flycatcher (nesting) territories are mapped in the project area, however potential habitat is present in wet meadows with a willow component and along riparian corridors. The LTBMU has delineated both suitable and emphasis habitat within the project area. Emphasis habitat is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component. These mapped habitat types are located in riparian habitat, such as Meeks Bay, Rubicon Creek, ephemeral unnamed drainages (e.g., Emerald Point), and Cascade Creek. Construction of trails in these mapped habitat types would be subject to TRPA limitations on development in stream environment zones. Prior to any development, protocol-level surveys for willow flycatchers would probably be required. If willow flycatchers are found, a LOP would be applied to a variable sized area around each nest from June 1 through August 31.

Summary

Areas where it might be possible to construct the off-street bikeway with minimal impacts include trail portions in and adjacent to urban areas such as the Lonely Gulch area. The species most likely to occur in and near these areas are those that are already adapted to human presence, activities, and noise (e.g., raccoons, coyotes, Stellar's jays). Sensitive species have been recorded near, but not within the urban areas (e.g., martens, ospreys). The lake shore alignment in D.L. Bliss State Park could be shifted west ¼ mile so that it was outside TRPA's osprey disturbance zone, and could be shifted ½ mile west of Emerald Point so that it was outside TRPA's nesting bald eagle zone. However doing so could potentially create conflicts with other wildlife issues, although they might be readily resolved. Potential issues include impacts on stream environment zones and mountain beavers (*Aplodontia rufa*), which are a species of concern that has been found in Bliss State Park. No LOPs, buffer zones, or Pacs are mandated for mountain beavers.

VEGETATION

Background

Existing Vegetation Communities

The project area includes several vegetation communities including Great Basin scrub, Jeffrey pine forest, riparian corridors, seasonal marshes, and wet montane meadows. Other series represented include the Greenleaf manzanita series, the Huckleberry oak series, and the Tobacco brush series.

The Great Basin scrub plant community is dominated by bitterbrush (*Purshia tridentata*) and mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a variety of forbs and grasses. Common grass species include squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*) and needlegrass (*Achnatherum* spp). Jeffrey pine forest is dominated by Jeffrey pine (*Pinus jeffreyi*), bitterbrush,

mountain big sagebrush, and a variety of forbs and grasses. Lodgepole pine (*Pinus contorta* ssp. *murryana*) and white fir (*Abies concolor*) are also found within this community type.

Dominant understory brush species represented in the Greenleaf manzanita, Huckleberry oak, and the Tobacco brush series include greenleaf manzanita (*Arctostaphylos patula*), huckleberry oak (*Quercus vaccinifolia*) tobaccobrush (*Ceanothus velutinus*), squawcarpet (*Ceanothus prostratus*), whitethorn (*Ceanothus cordualtus*), bittercherry (*Prunus emarginata*), and chinquapin (*Chrysolepis semprvirens*). Overstory species include incense cedar (*Calocedrus decurrens*) and scattered sugar pine (*Pinus lambertiana*).

Stream Environment Zones

The Tahoe Regional Planning Agency defines a stream environment zone (SEZ) as a biological community that derives its characteristics from the presence of surface water or a seasonal high groundwater table. An SEZ is delineated by the presence of drainage ways and floodplains, including adjacent marshes, meadows, and riparian vegetation. SEZs are riparian areas identified by the presence of at least one primary indicator or three secondary indicators.

Primary Indicators are as follows:

- Evidence of surface water flow, including perennial, ephemeral and intermittent streams, but not including rills or human-made channels;
- Primary riparian vegetation;
- Near surface groundwater (less than 20 inches from the surface);
- Lakes or ponds;
- Beach soil; or
- One of the following alluvial soils:
- Elmira coarse sand, wet variant; or
- Marsh.

Secondary Indicators are as follows:

- Designated flood plain;
- Groundwater within 20 to 40 inches of the surface;
- Secondary riparian vegetation; and
- One of the following alluvial soils:
- Loamy alluvial land;
- Celio gravely loamy coarse sand; or
- Gravely alluvial land.

In addition, TRPA has identified SEZ factors and developed definitions that described SEZs. Included in definitions was "Vegetation, such as alders, willows, aspen and lodgepole pine…." Scouler's willow (*Salix scouleriana*), which most likely occurs throughout the project area, is considered to be a facultative wetland species in California. It is often found mixed in with upland plant communities and can tolerate fairly dry conditions yet it has been considered an SEZ indicator species.

The proposed off-street bikeway corridor crosses several creeks and associated SEZs. Numerous other SEZs most likely occur in the project area and are not obvious on existing maps. SEZs may contain habitat for sensitive wildlife species, such as willow flycatchers. Potential SEZs would require verification by a specialist as well as TRPA, further constraining alternative selection.

Jurisdictional Wetlands and Waters of the United States

Jurisdictional wetlands most likely occur within the proposed project corridor. "Waters of the United States" (Waters), of which some are clearly defined on maps, may also require mapping if there are potential impacts.

Jurisdictional wetlands are subject to the provisions of Section 404 of the Clean Water Act. Waters of the United States are identified following definitions provided in the Army Corps of Engineers (ACE) regulation [33 CFR 328.4(a)(b) and (c)]. The limits of jurisdiction in non-tidal waters extend to the ordinary high water mark. Wetland delineation is based on three technical criteria; 1) hydrophytic vegetation, 2) wetland hydrology, and 3) hydric soils. Positive indicators of all three criteria must normally be present in order for the area to be classified as a wetland. Drainages with evident channel widths and high water marks are considered Waters. These include ephemeral drainages.

Delineations of would be required if alternatives cross potential wetlands. Consultation with the ACE would be necessary if construction activities could impact wetlands. In addition, if Section 404 permits are required for wetland fill, the Regional Water Quality Control Board must provide water quality certification under Section 401 of the Clean Water Act, certifying that the discharge related to those federally permitted activities would be in compliance with state standards.

Potential Impacts

A complete list of potentially occurring species in the project area as reported by the California Natural Diversity Database is included as an appendix to this study. Only one species, Tahoe yellow cress (*Rorippa subumbellata*) is currently listed as Endangered in California under the California Endangered Species Act. Special Status Species include the following:

- Plant species listed or proposed for listing or candidates for listing under federal or state Endangered Species Acts
- Species protected under local jurisdictions

- Plant species on List 1 and 2 listed in the 1994 edition of the Inventory of Rare and Endangered Vascular Plants of California
- Plant species considered Species of Special Concern by the United States Fish and Wildlife Service (USFWS) or California Department of Fish and Game (CDFG)
- Plants species by other federal agencies such as the United States Forest Service (USFS)

Nine mapped occurrences of Tahoe yellow cress (TYC) occur within the proposed project. However, not all occurrences have been recently recorded. Several occurrences are in the vicinity of Emerald Bay and Emerald Bay Point and should not be affected by the proposed route, unless by secondary impacts such as increased use of the areas associated with the bike path. Impacts from construction close to populations and/or habitat could include trampling, sedimentation, and other run-off.

Development in SEZ and Wetland Areas

As noted in chapter 2 of this Bikeway Study, the Basin Plan for the Lahontan Region describes Regional Board concerns regarding development in SEZs and floodplains. Specific findings must be made before the Regional Board can grant exemptions to prohibitions against new development or permanent disturbance in SEZs or grant exceptions to the 100-year floodplain discharge prohibitions in cases where the floodplain is not also a SEZ.

According to Regional Board staff, the off-street bikeway alternative does not appear to fit into the category of public outdoor recreation facilities where the project, by its very nature, must be sited in a floodplain or SEZ. Instead, the bikeway projects appear to fit best into the public service facilities category. For public service facilities, an exception to the prohibitions against discharges or threatened discharges for new development or permanent disturbance in SEZs for discharge may be granted if all these findings can be made:

a. The project is necessary for public health, safety, or environmental protection;
b. There is no feasible alternative, including spans, which would avoid or reduce the extent of encroachment;
c. The impacts SEZs are fully mitigated; and
d. SEZ lands are restored in an amount 1.5 times the area of SEZ disturbed or developed by the project.

Similar findings must be made (5.7-7) must be made for exceptions to 100-year floodplain discharge prohibitions, in cases where the floodplain is not also an SEZ. Information on restrictions on new development in excess of the land capability system limits on Class 1a, 1c, 2 or 3 lands can be found in Chapter 5.8-6,7.

Before projects requiring these exemptions could be permitted, it would be up to the project proponent to demonstrate how exemption criteria to these prohibitions are met. If mitigation is required, a written description of the location, nature, and timing for completion of the 1.5:1 compensatory mitigation required for new coverage and disturbance to SEZs. A permit or other

approvals can not be issued until mitigation issues are resolved. To make the findings that "the impacts will be mitigated" (per the findings in the Basin Plan, section 5.7), the restoration mitigation plan must show how on and off-site restoration will mitigate loss of existing SEZ functions and value at the project site. Replacing or improving functions and values on-site is the best mitigation.

Summary

An off-street bike path along the shoreline areas within Emerald Bay and D.L. Bliss State Parks could have significant impacts on sensitive species (e.g. Tahoe yellow cress), SEZs, and jurisdictional wetlands.

GEOLOGY, SOILS, AND EROSION

Background

The study area is underlain primarily by granitic rocks and soil, and rocks derived from granitic rocks due to glaciation. Landsliding and avalanches have previously occurred in the area around Emerald Bay. Recent studies indicate that an earthquake fault zone may run along the Lake's west shore, but the potential for seismic activity is not yet known. The early 1970's natural hazards maps show the corridor area to fall in the low to moderate category related to ground instability and seismic shaking, except in the area around Emerald Bay and the Spring Creek area at the south end of the alignment, where the maps indicate the next level of ground shaking potential.

Potential Impacts

The off-street bikeway corridor would start a few hundred feet to the south of Spring Creek and run northerly, parallel to and to the east of SR-89 for about one half mile. A bridge would be required for the crossing of Spring Creek. If an existing bridge is not used, care must be taken to prevent erosion and sediment transport to the creek during construction of the bridge foundation and supports. The path for this segment of the bike trail would be on recent alluvium and would not cause adverse erosion if reasonable care is taken in preparation of the path base.

At Cascade Road, the bike path alignment would diverge from SR-89 and utilize Cascade Road into the Cascade Properties residential area. From Cascade Road, the alignment would need to extend off-street between existing private residences toward Cascade Creek. The proposed bike path at this location would make a jog to the west for about 300 feet over glacial deposits to an existing bridge crossing Cascade Creek in the housing development along Cascade Creek. The path then follows a northerly direction over glacial outwash and alluvial material for about 5,000 feet to Eagle Point at the entrance to Emerald Bay. The bike pathway constructed over the glacial deposits for the initial 1,500 feet will be cut into a slope requiring temporary measures to prevent transport of sediment during summer storm events and permanent slope protection and drainage control mitigation on all exposed cut and or fill slopes. The next 4,000 feet would be over relatively flat terrain of a mixture of glacial deposits and alluvium. Cuts and fills on the flat terrain probably would not result in adverse erosion during construction of the base for the bikeway pavement.

The next segment of the bike trail follows the entire shoreline of Emerald Bay up to Emerald Point, passing by the State campground on the south side of the bay, Vikingsholm at the west end of the bay and the boating campground on the north shore of the bay. At some locations there is a

relatively narrow beach between the glacial deposits and the bay. The bike path constructed over the glacial deposits would be cut into slopes requiring temporary measures to prevent transport of sediment during summer storm events and permanent slope protection and drainage control mitigation on all exposed cut and/or fill slopes.

The next 1,000 feet segment of the bike trail crosses the west edge of Emerald Point peninsula. This segment of the bike trail would cross over the Quaternary glacial deposits and would require the same construction practices as used around Emerald Bay.

The next northerly two-mile segment follows along the shoreline of Lake Tahoe to Rubicon Point. With the exception of a few reaches of very narrow beach sands or lakebed deposits, the entire reach is over Mesozoic age granitic rocks or weathered granite. These materials are subject to high erosion potential when disturbed or if the existing vegetation is damaged or removed. Any bikeway construction in this area should be constructed on an alignment that would require the least disturbance with little or no cutting and filling or removal of vegetation. Due to the high erosion potential of these materials, it will be necessary to provide temporary measures to prevent transport of sediment during summer storm events and permanent slope protection and drainage control mitigation on all exposed cut and/or fill slopes.

At Rubicon Point the trail alignment turns to a more westerly direction along the base of the hill for about 1,500 feet. The hillside and the slopes consist of granite and weathered granite with Quaternary lake deposits between the base of the slope and Lake Tahoe. If at all possible the trail should be constructed over the lakebed deposits to prevent disturbance of the highly erodible granite and weathered granite along the base of and on the hillside. If the path for this segment of the bike trail is on the lakebed deposits it will not cause adverse erosion if reasonable care is taken in preparation of the path base. If it is necessary to move the trail up on to the granitic materials, the design adopted must provide for the least amount of disturbance with little or no cutting and filling or removal of vegetation to minimize the amount of erosion and transport of sediment to the lake.

The next northwesterly trending 4,000 feet segment of the bike trail traverses over the Quaternary age lake deposits to the west of the Paradise Flat recreational homes development passing on to glacial deposits as the trail approaches SR-89. This portion of the bike trail on the lakebed deposits would not cause adverse erosion if reasonable care is taken in preparation of the path base.

As the alignment of the bike trail merges with the east shoulder of SR-89 it passes on to glacial deposits for about 3,000 feet and then on to a mixture of highly erodible granite and weathered granite and glacial moraine deposits for the next 2,000 feet. The design for the segment of the trail on granitic materials must provide for the least amount of disturbance with little or no cutting and filling or removal of vegetation to minimize the amount of erosion and transport of sediment to the lake.

To the north of Rubicon Properties development the alignment follows the east shoulder of SR-89 in a north/northeasterly direction along the approximate contact between glacial deposits to the west and Quaternary age lake deposits to the east for about 5,000 feet to the headlands to the south of Meeks Bay. The portions of the bike trail on the lakebed deposits will not cause adverse erosion if reasonable care is taken in preparation of the path base.

The proposed bike trail passes over the granitic headlands to the south of Meeks Bay in a north/northwesterly direction about 400 feet to the west of the lakeshore. The entire reach is over Mesozoic age granitic rocks or weathered granite. These materials are subject to high erosion potential when disturbed or if the existing vegetation is damaged or removed. If at all possible the trail should be constructed on an alignment that would require the least disturbance with little or no cutting and filling or removal of vegetation. As the trail drops off of the headlands it turns in a more westerly direction and passes on to Quaternary age lakebed deposits and remains on them to the termination at Meeks Bay Resort and Marina. This segment of the bike trail is on the lakebed deposits and should not cause adverse erosion if reasonable care is taken in preparation of the path base.

Summary

Due to the high erosion potential of these materials, it will be necessary to provide temporary measures to prevent transport of sediment during summer storm events and permanent slope protection and drainage control mitigation on all exposed cut and/or fill slopes. All disturbed area must be revegetated to prevent erosion.

Extensive studies have been made in the Lake Tahoe area on erosion and sediment control technology showing best management practices for construction on the various geologic materials found in the area. They are contained in a publication by the entitled U. S. Environmental Protection Agency in " Demonstration of Erosion and Sediment Control Technology, Lake Tahoe Region of California" EPAA-600/2-78-208. The construction practices outlined in this document would reduce the impact of the land disturbances to within reasonable limits during and after the installation of the bike trail. Under all options discussed above, facilities will also be required to control and dispose of runoff year round from the paved surfaces to prevent erosion and transport of sediment to all streams and to the lake.

CULTURAL RESOURCES

Background

Known Heritage Resources

Heritage sites with or adjacent to the project area include: P-9-52-H (Vikingsholm Boat Houses), P-9-53-H (Vikingsholm Power House) and P-9-1269 (1930s skid trails for tractor yarding of logs); CA-Eld-190-H (historic board scatter and old road trace); CA-Eld-729 (prehistoric bedrock mortar at Eagle Point); Meeks Bay prehistoric bedrock mortar; CA-Eld-1055 (Meadow Park historic complex, Lindström 1999, NCIC file no. 3308); Emerald Bay Resort; Isolated Finds #1-3 (Lindström 1990); Dexter (1995) isolates #1 (two obsidian waster flakes) and #2 (small milled timber horse bridge); Meeks Bay Resort; FS #05-19-674 (Vikingsholm Dump); FS #05-19-675 (two piles of split wood, Maher 1995); Banka (1997) sites #1 (cedar fence posts),# 2 (road grade or skid trail), #5 (road grade), #7 (rock wall), #10 (historic building), USFS #05-19-387 (historic cabin depression), and USFS #05-19-673 (prehistoric lithic scatter).

According to the Office of Historic Preservation (OHP) Historic Property Directory (HPD), two National Register of Historic Places districts are listed within the project area: (1) Vikingsholm (NR-17), including 11 contributing properties (water tanks, warehouse, main house, teahouse, duplex,

road, boat bay, gardener's cottage, rock work and trail, and transformer building); and (2) the Newhall Estate. The Newhall Estate Entrance Pillars are also designated as a Point of Historical Interest (PHI-Eld-009). Vikingsholm is shown as map point #8 on the Tahoe Regional Planning Agency (TRPA) historical sites map (1984).

In his interviews with Washoe elders, ethnographer Stanley Freed (1966) recorded several important Washoe camps within the project area. In the vicinity of Cascade Creek he noted a popular fish camp, dEyEli'bukhwOnhu (Freed #7) and a locale where red clay was mined near the lake and used as body decoration and paint for bows and arrows. These sites are shown on a TRPA map (1984) as a Washoe "special function" and fish camp. Along Rubicon Bay and near Paradise Flat, Freed recorded wO'thanamIna as a "resting spot" and not a "full-fledged camping site (Freed #29). This locale is also noted as a "special function" site on the TRPA historical map (1984). A fish camp magaulu'wO'tha, was located along a small stream about two miles south of Meeks Bay (Freed #8). The locale is designated as a "fish camp" on the TRPA map (1984). At Meeks Bay Freed noted ma'yalawO'tha, a midsummer camping spot where fish, berries and seeds were collected (Freed #9). The camp was below the SR-89 Bridge. This camping spot was also recorded by d'Azevedo (1956) as ma'yala wa'ta, well known to Washoe as a mineral spring. The TRPA map (1984) shows this locale as a "fish camp", with a "special function" site also located about one-half mile to the south. The Washoe referred to an area in Emerald Bay as silat'as, meaning "place of the tiger lilies" (Lilium parvum), which they harvested and ate both raw and roasted (Nesbitt et al. 1990). Historic photographs of a Washoe camp at the mouth of Emerald Bay appear in a number of popular publications. Two photographs (Nevada Historical Society n.d. and Seaver Center n.d in Nesbitt et al. 1990.) show a bark structure and Washoe women in front of the camp. Washoe are known to have camped on Paradise Flat on Rubicon Bay, with a large camp being reported near Three Ring Road (Lindström 1998).

On his low-water Lake Tahoe shoreline survey for the USFS-LTBMU, Blanchard (1988) noted a number of lakeshore sites. On the Meeks Bay 7.5' quadrangle, he noted prehistoric lithic scatters (#14, 19, 24), anomalous stone piles, linear arrangements and jetties (#17, 20), boat launch "way" tracks (#18), pier pilings (#21, 22, 25, 26, 27, 28, 29), and wire rope (#30). On the Emerald Bay 7.5' quadrangle, he observed wire rope/cable (#1, 3, 6, 11), prehistoric lithic scatters (#2, 27), anomalous rock alignments (#7, 10), historic artifacts (#8, 15, 18, 19), cobblestone wall work (#9), pier pilings (#12, 13), way tracks (#24), and possible Native American milling features (#3, 20, 21, 22, 25, 26).

In 1988, Woodward (1991) also surveyed the exposed shorelines of Emerald Bay State Park between the 6229 and 6222-foot elevations. Findings include prehistoric bedrock milling features and portions of the Vikingsholm historic complex. Woodward's study was supplemental to a historical, ethnographic and archaeological inventory report on Emerald Bay State Park by Nesbitt, Evans, and Kelly (1990), wherein features of the Emerald Bay Resort were mapped and recorded.

Green (in progress) recently conducted a survey of the Rubicon Trail along the north side of Emerald Bay and north through D.L. Bliss State Park. A number of wall/gate/fence features and historic trash scatters were recorded. Many features are associated with Civilian Conservation Corps (CCC) trail construction during the 1930s.

Expected Archaeological Sensitivity

The project area is considered to have a low to high level of sensitivity to contain both Native American and Euroamerican heritage resources. The wide range in sensitivity levels is largely dependent upon terrain factors. Native American sites are known to occur along wetlands and meadows, on flat lakeshore margins (e.g. Meeks Bay and Paradise Flat) and at the mouths of creeks emptying into Lake Tahoe (e.g., Meeks Creek, Lonely Gulch, Rubicon Creek, Eagle Creek, Cascade Creek, etc.). The project's steeply rugged and heavily forested terrain is less likely to contain Native American sites. In addition to archaeological resources, the project may contain resources of traditional value to contemporary Native Americans that should be taken into consideration during future project planning.

Significance of Resource

If project impacts are likely to occur, the significance of the resource must be determined. A determination of significance is commonly based upon the four criteria of eligibility for inclusion in the National Register of Historic Places (NRHP 36 CFR 60.4). Another federal program that acknowledges significance is the National Historic Landmark Program. The California Environmental Quality Act (CEQA Section 15064.5) has established significance criteria that are modeled after National Register guidelines. California also has a State Register, State Historic Landmark Program and Point of Historic Interest Program that recognize buildings, sites, and objects of local or statewide importance. In the Lake Tahoe Basin, the importance of a cultural resource is also assessed according to Subsection 29.5 of the TRPA Code.

Potential Impacts

In general, several potential project-related effects are most likely to occur within the project area. These impacts may result from the disturbance or destruction of prehistoric or historic archaeological sites during project ground disturbance activities, and/or general changes in land use that may affect the integrity of the setting of heritage properties by introducing incompatible visual or audible elements into the setting of a potentially significant resource. In addition, indirect impacts due to increased public access into an area containing a site could result in vandalism. Of further concern are potential impacts to natural resources of importance to contemporary Native Americans, such as traditional plants.

Once the project alternative has been selected and heritage resources have been formally recorded as part of an intensive archaeological field reconnaissance, specific measures to mitigate impacts to significant resources can be developed. A means to monitor mitigation should also be identified. Prior to project ground disturbance activities, field-related mitigation activities should be implemented in consultation with appropriate federal, state and local agencies and the Washoe Tribe (if appropriate). Mitigation measures can include project modification designed to protect and/or avoid a site. In lieu of project modification, a data recovery program might be implemented.

Summary

Findings of this preliminary literature search of known heritages recorded within the project area suggest that there are no "fatal flaws" regarding heritage resources. Impacts to known heritage resources can be mitigated to a less than significant level with implementation of one or more of the following mitigation measures.

SCENIC QUALITY

Background

The visual landscape of the Tahoe Region contains the unusual combination of rugged mountain peaks, the vast, flat lake surface, and thickly forested slopes. This combination of landscape elements makes it one of the truly unique places in the world. The 1980 Tahoe Regional Planning Compact states that the "social and economic health of the region depends on maintaining the significant scenic . . .values provided by the Lake Tahoe Basin" and mandates TRPA to preserve scenic beauty by insuring an "equilibrium between the region's natural endowment and its manmade environment." In 1982, TRPA adopted environmental threshold standards in nine areas, included scenic quality. At that time, each of 33 "shoreline units" was scored based on the view of the backdrop, the character of the shoreline and natural and man-made features. A moderate status quo baseline score was established as the desired measure of scenic quality that would allow shoreline development to occur but not dominate over and contrast with the natural landscape.

The Cascade to Rubicon Bay area includes Scenic Shoreline Units 5 and 6, and Scenic Roadway Unit 3. The entire area, including SR-89, is considered a scenic travel corridor. Special Policies for this area related to visual quality, identified in TRPA's Emerald Bay Plan Area Statement, include:

- Retaining walls or other similar manmade structures along the highway should incorporate the use of materials that blend with the natural character of the area.
- All proposed uses shall be evaluated against scenic evaluation criteria to ensure maintenance of scenic quality.

Potential Impacts

Construction of a Class I paved bike path along the shoreline between Emerald Bay and Rubicon Bay would be expected to result in significant impacts to the scenic quality of the area. According to Chapter 1000 of the Caltrans Highway Design Manual, which includes standards for bike path design, Class I bike paths generally attract less skilled bicyclists, so it is important to avoid steep grades in their design. The maximum grade rate recommended for bike paths is 5%, and it is desirable that sustained grades be limited to 2% if a wide range of riders is to be accommodated. In order to maintain a relatively level trail profile, where gradients and cross-slopes do not exceed the recommended maximums, cut and fill would be required for segments of the path along the shoreline of Emerald Bay and D.L. Bliss State Parks. Additionally, Chapter 1000 discusses minimum trail clearances. A minimum lateral clearance of 2 feet of graded surface on each side of the trail is required, meaning than an 8 foot paved trail would be effectively 12 feet in width including the lateral clearances. A minimum vertical clearance of 8 feet across the clear width of the path is required, with 10 feet of vertical clearance recommended. In order to provide sufficient lateral and vertical clearances along the bike path alignment, a substantial amount of tree removal would be likely be necessary.

Summary

In forested areas upslope of the Lake, constructing a Class I paved bike path may be possible without resulting in substantial visual impacts. Such locations would include areas of relatively flat

topography, where substantial earthmoving and tree removal is not necessary in order to build the trail. Within the project study corridor, most areas of minimum visual impact would occur north of Emerald Bay State Park, where a bike path alignment could parallel the highway and would not be visible from the Lake. Along the shoreline of the Lake, particularly around Emerald Bay, constructing a Class I bike path would be expected to significantly degrade the visual quality of the area.

OTHER CONSIDERATIONS

PRIVATE PROPERTY

Extension of an off-street bikeway from Spring Creek Road into a shoreline alignment within Emerald Bay State Park would require extending through the Cascade Properties private residential neighborhood. Cascade Road could provide for a possible bikeway alignment with few environmental impacts, but because it is a private road its use would require an easement from Cascade Properties. Another, more difficult issue, would be connecting from Cascade Road to the shoreline area of Emerald Bay park, which would required extending directly through a private lot. This would require an easement from the property owner.

STATE PARKS CARRYING CAPACITY

During the Technical Advisory Committee meetings, State Parks staff indicated that increasing visitorship to Emerald Bay State Park may not be a desirable result of the bikeway. To the extent that an off-street bike path would contribute to an increase in visitors to Emerald Bay State Park, this would be considered a negative impact by State Parks.

It is not clear that a bike path into Emerald Bay would actually increase the number of visitors. It is possible that a bike path might simply change the mode of travel that some existing visitors use to get into the park, in other words encourage people to bicycle into the Park rather than drive. The extent to which the trail would be used by existing visitors would be largely dependent on the final alignment chosen. Any pathway that would require substantial elevation changes would likely limit the ability of casual recreational cyclists to ride it.

ALTERNATIVE 2: ON-STREET BIKEWAY

OVERVIEW OF ALTERNATIVE

The On-Street Bikeway alternative included consideration of all on-roadway options for the Cascade to Rubicon Bay corridor. For segments along SR-89, two variations were considered: 1) Widening/striping the roadway to provide Class II bike lanes; or 2) Widening/striping the roadway to provide wide shoulders without bike lane designation. In areas where residential roads, park service roads, or other existing roadways are present adjacent to the highway alignment, this Alternative considered the use of such roadways as Class III bike routes.

ENGINEERING CONSIDERATIONS

The possibility of developing various on-street bikeway segments was assessed with a detailed field review of SR-89 and other roadways within the project corridor. Measurements of typical SR-89 cross-sections were taken along the entire corridor, and are shown in **Figures 3-5, 3-6, 3-7, 3-8, 3-9, 3-10, 3-11, and 3-12**. It should be noted that these are illustrative graphical cross sections, and not detailed engineering drawings.

Caltrans is currently conducted a Project Study Report for SR-89 between the Placer County line and the Alpine County line to conduct water quality improvements. These improvements will include the provision of 4-foot shoulders along SR-89 where possible. This project will occur independently of any specific bikeway projects.

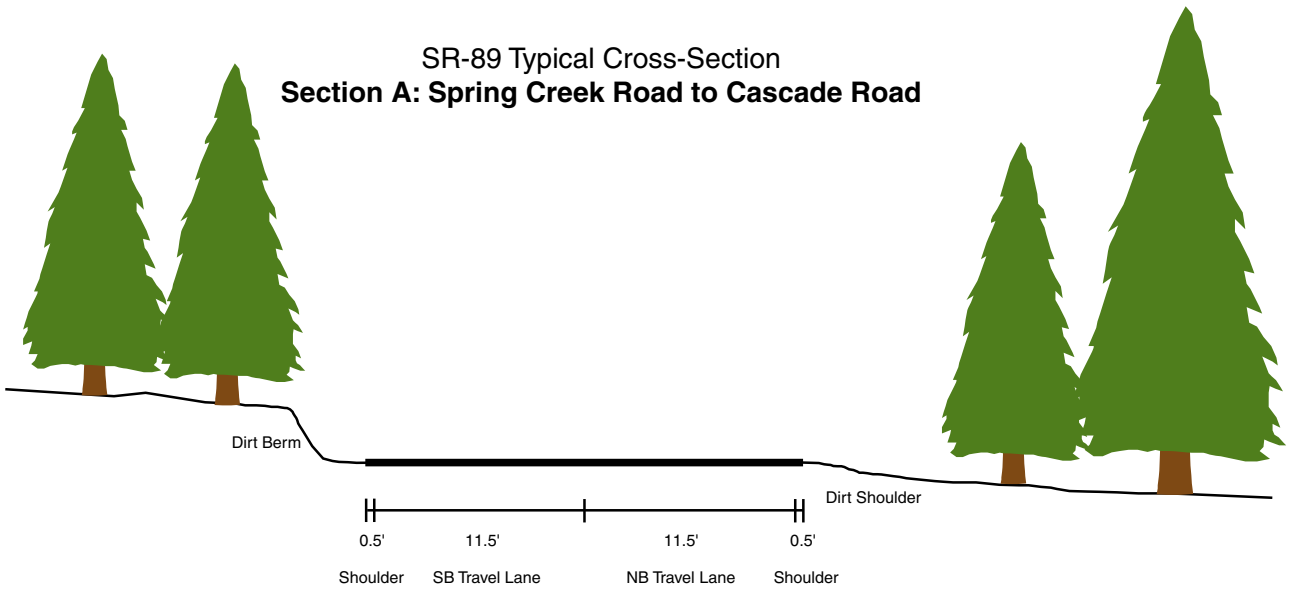
BIKE LANES VERSUS SHOULDERS

Class II bikeways (bike lanes) for preferential use by bicycles are established within the paved area of highways. Bike lane stripes are intended to promote an orderly flow of traffic, by establishing specific lines of demarcation between areas reserved for bicycles and lanes to be occupied by motor vehicles. This effect is supported by bike lane signs and pavement markings. Bike lane stripes can increase bicyclists' confidence that motorists will not stray into their path of travel if they remain within the bike lane. Likewise, with more certainty as to where bicyclists will be, passing motorists are less apt to swerve toward opposing traffic in making certain they will not hit bicyclists.

However, while bicycle lanes provide a dedicated space for cyclists, they could have some disadvantages with respect to the Cascade to Rubicon Bay corridor: During the Technical Advisory Committee meetings and public meetings, various individuals commented that formal Class II bike lanes would not be an appropriate treatment for the project corridor, and that wide striped shoulders would be preferable. The following issues were raised:

Design Requirements. Designation as Class II triggers specific design and signage requirements as outlined in Chapter 1000 of the Caltrans Highway Design Manual. These include minimum bike lane widths (4 feet where no gutter exists), minimum widths of roadway lanes next to bike lanes (12 feet), and requirements for striping (150 mm white outside stripe), stencils, and signage (the R81 bike lane sign shall be placed at the beginning of all bike lanes, at all major changes in direction, and at maximum 1 kilometer intervals). Any additional signage on the roadway could affect the scenic quality of the roadway. Striping and stenciling could have maintenance implications, given the snowplowing activities that occur on SR-89 throughout the winter. Extensive striping and stenciling of Class II bike lanes would likely require annual repainting each spring (although relatively frequent repainting would likely be required of wide striped shoulders as well).

Motorist expectations. The California Vehicle Code Section 21208 states: (a) Whenever a bicycle lane has been established on a roadway pursuant to Section 21207, any person operating a bicycle upon the roadway at a speed less than the normal speed of traffic moving in the same direction at that time shall ride within the bicycle lane, except that the person may move out of the lane under any of the following situations:



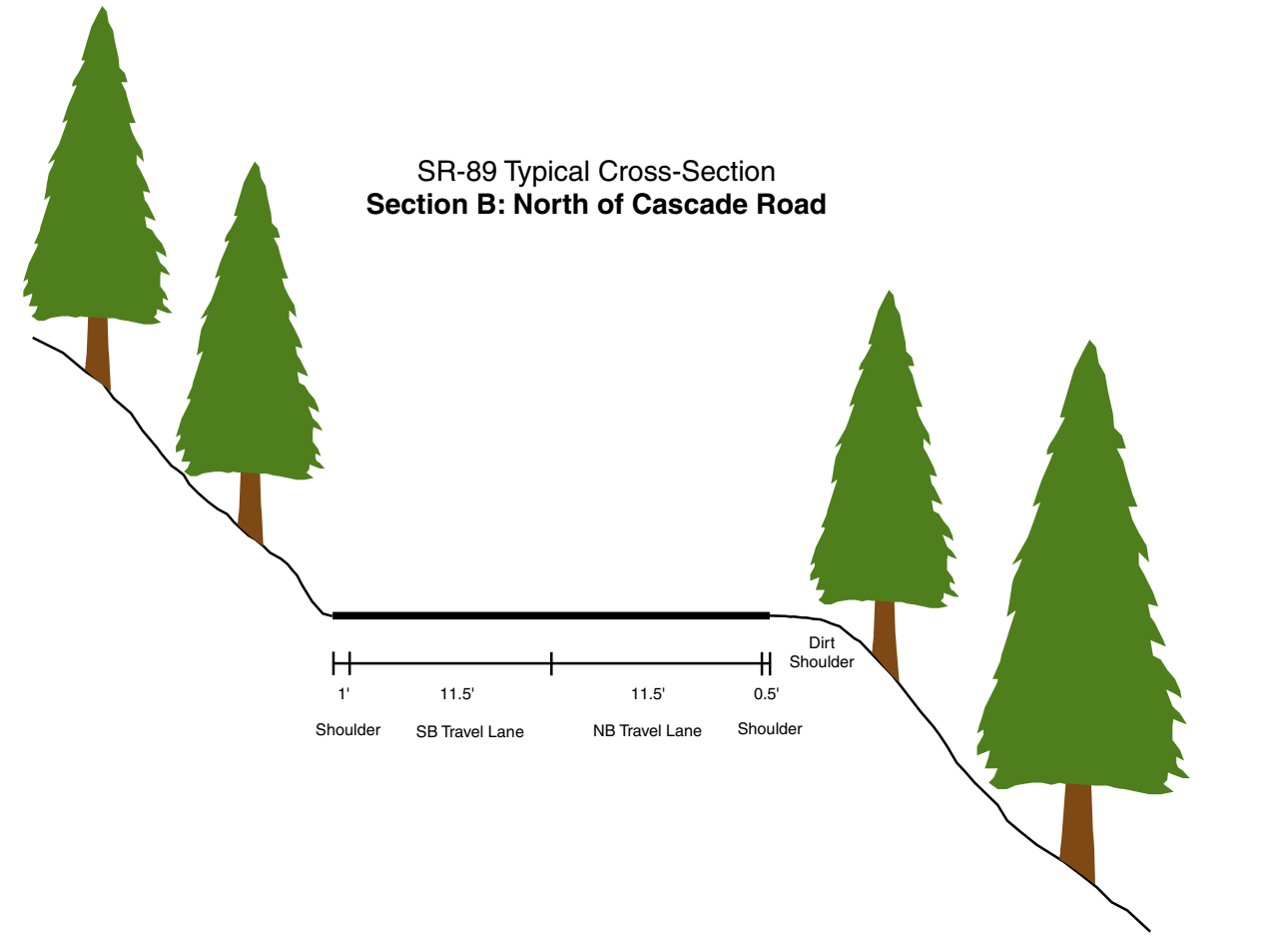


Figure 3-5
Typical Highway Cross-Sections A & B

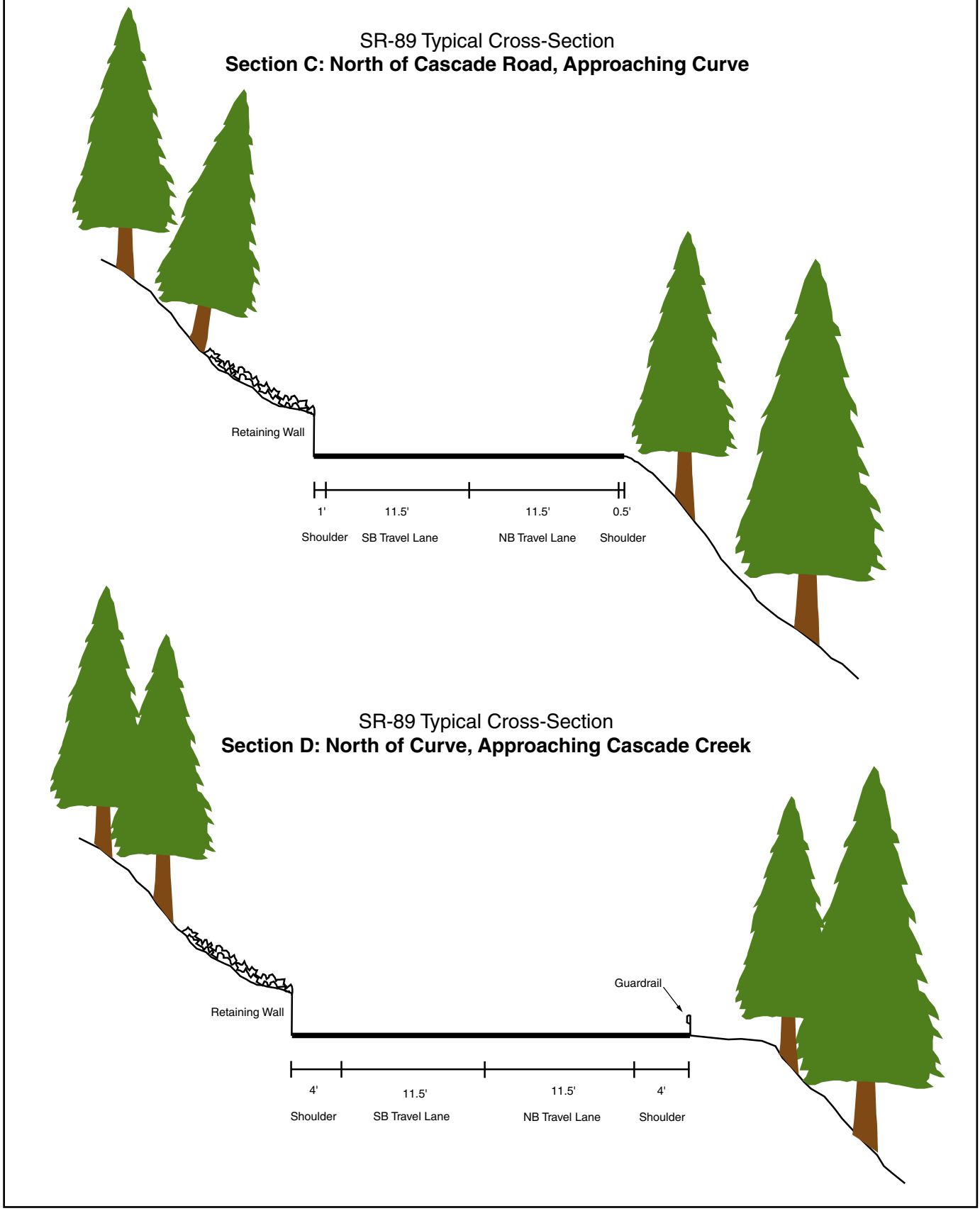


Figure 3-6
Typical Highway Cross-Sections C & D

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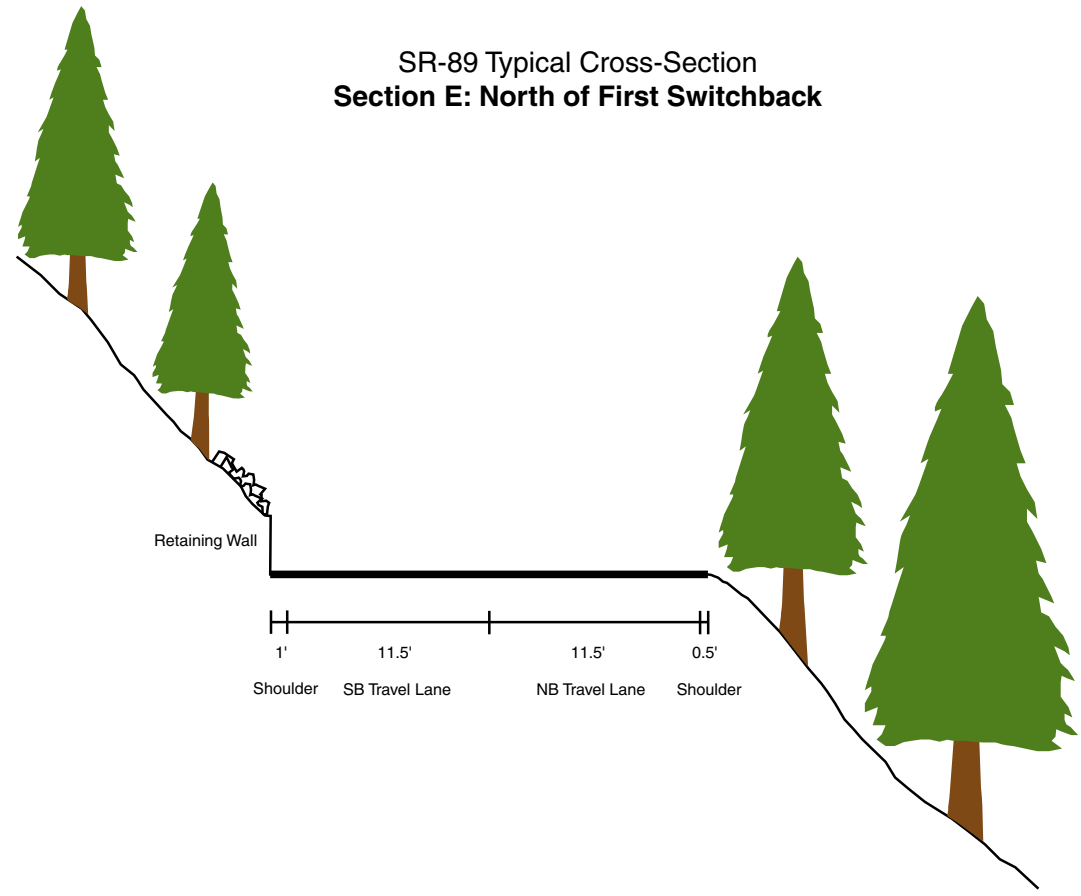


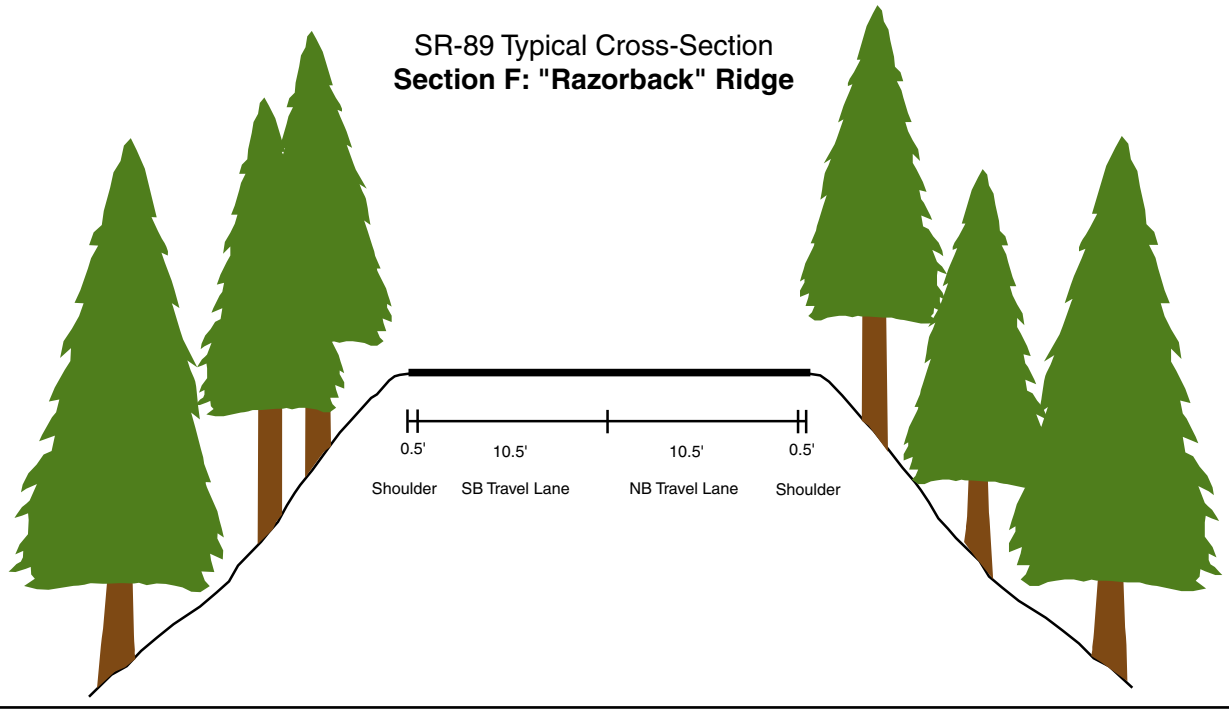
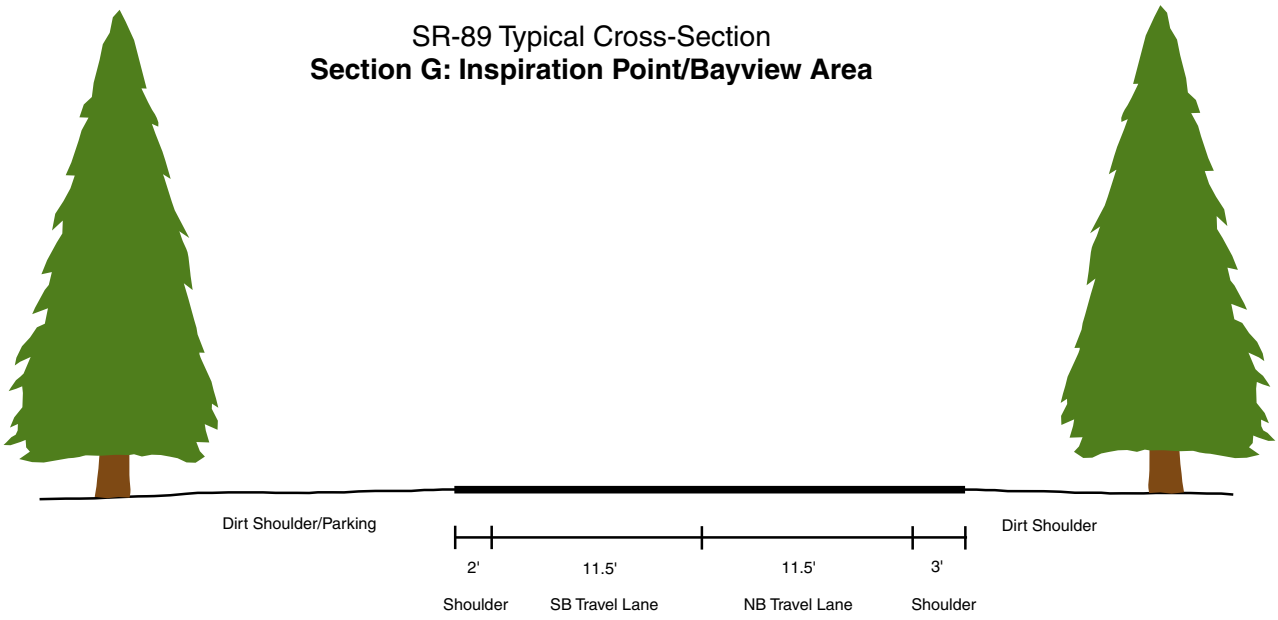


Figure 3-7
Typical Highway Cross-Sections E & F



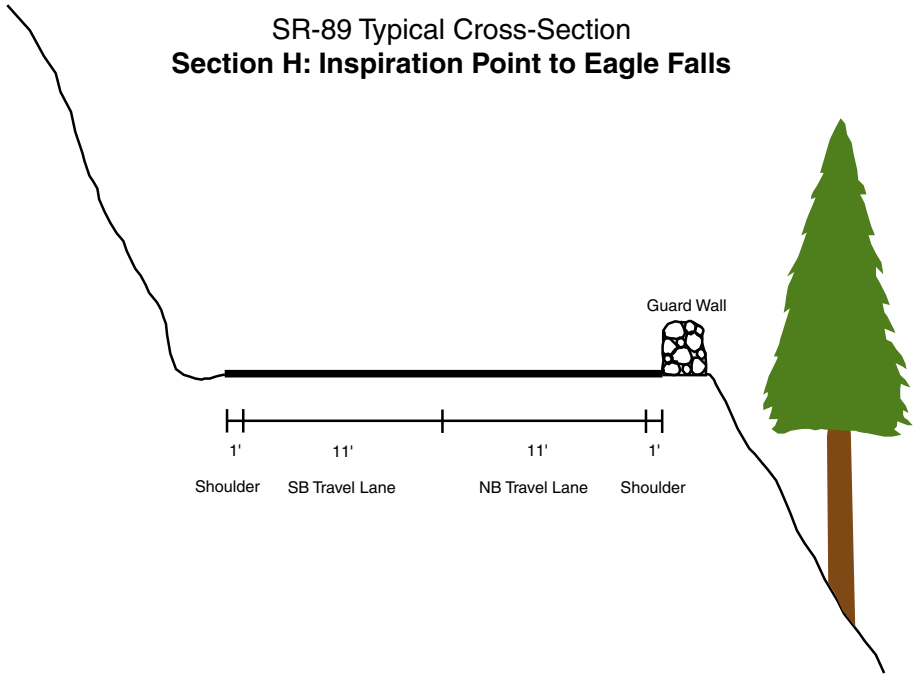
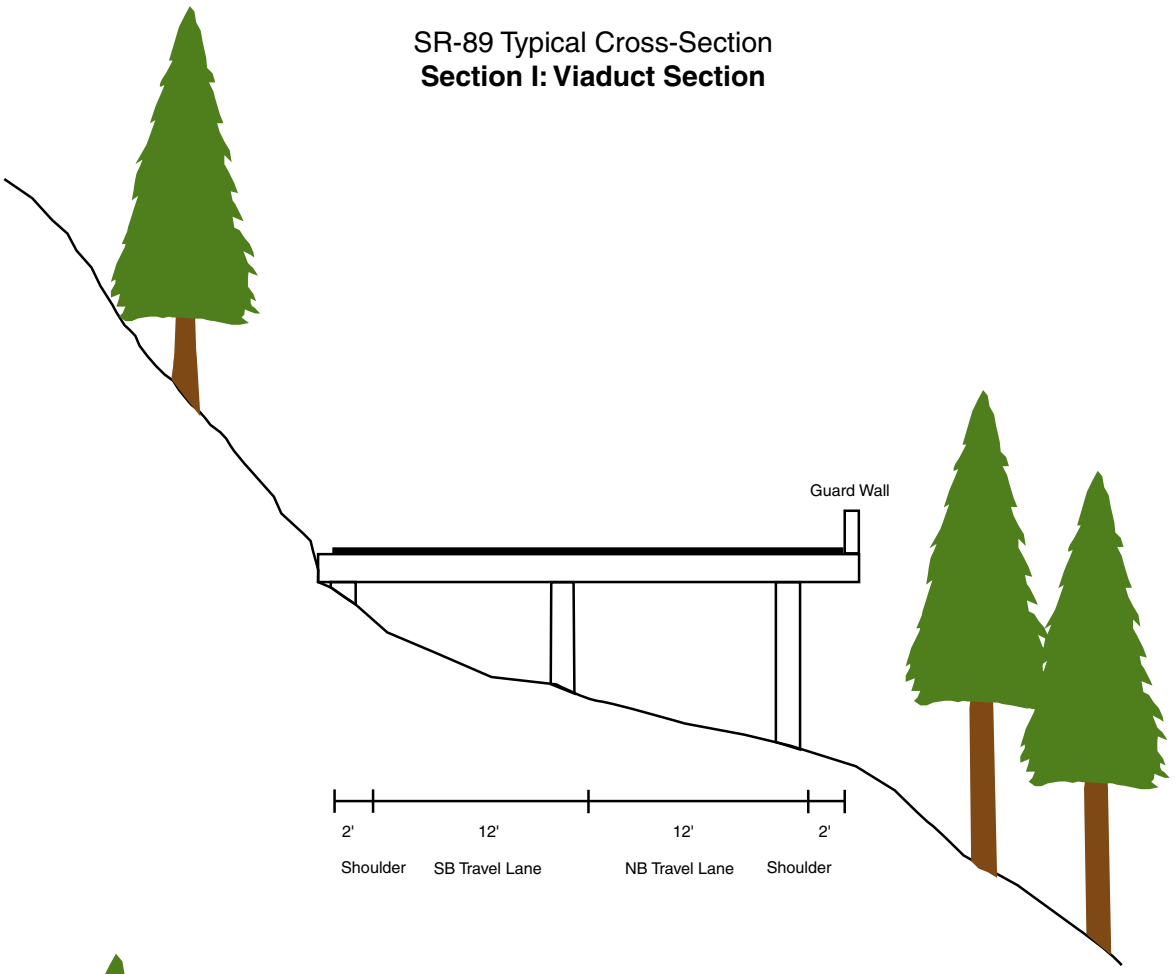


Figure 3-8
Typical Highway Cross-Sections G & H



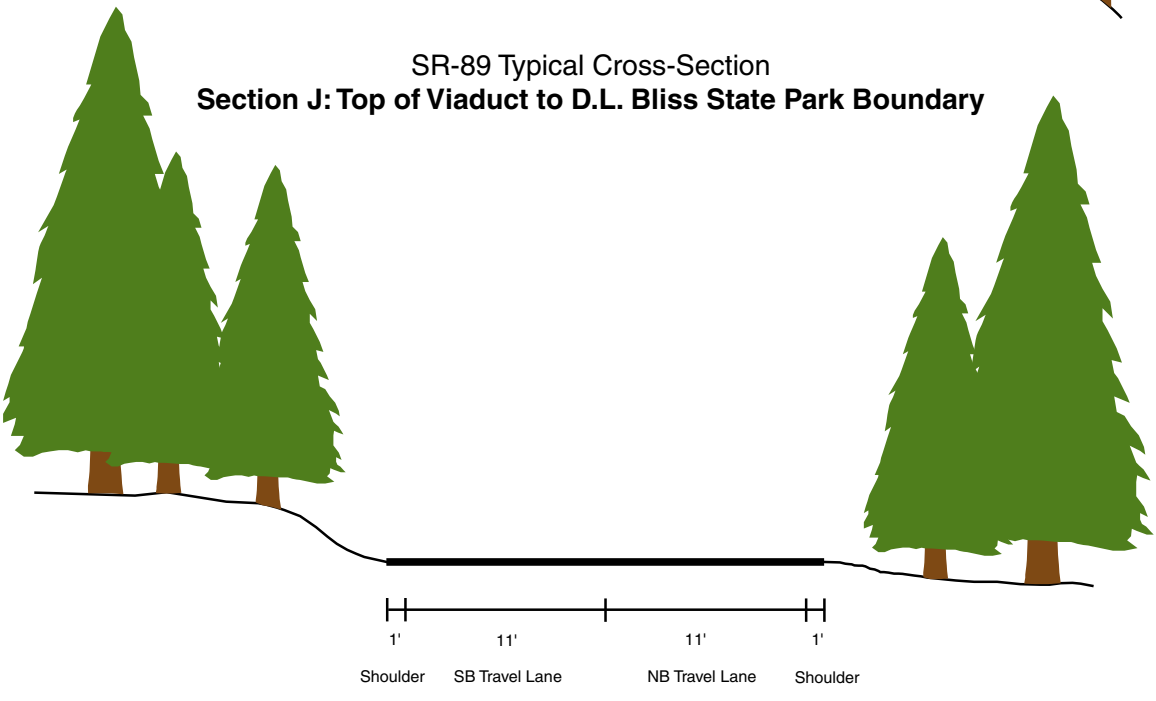
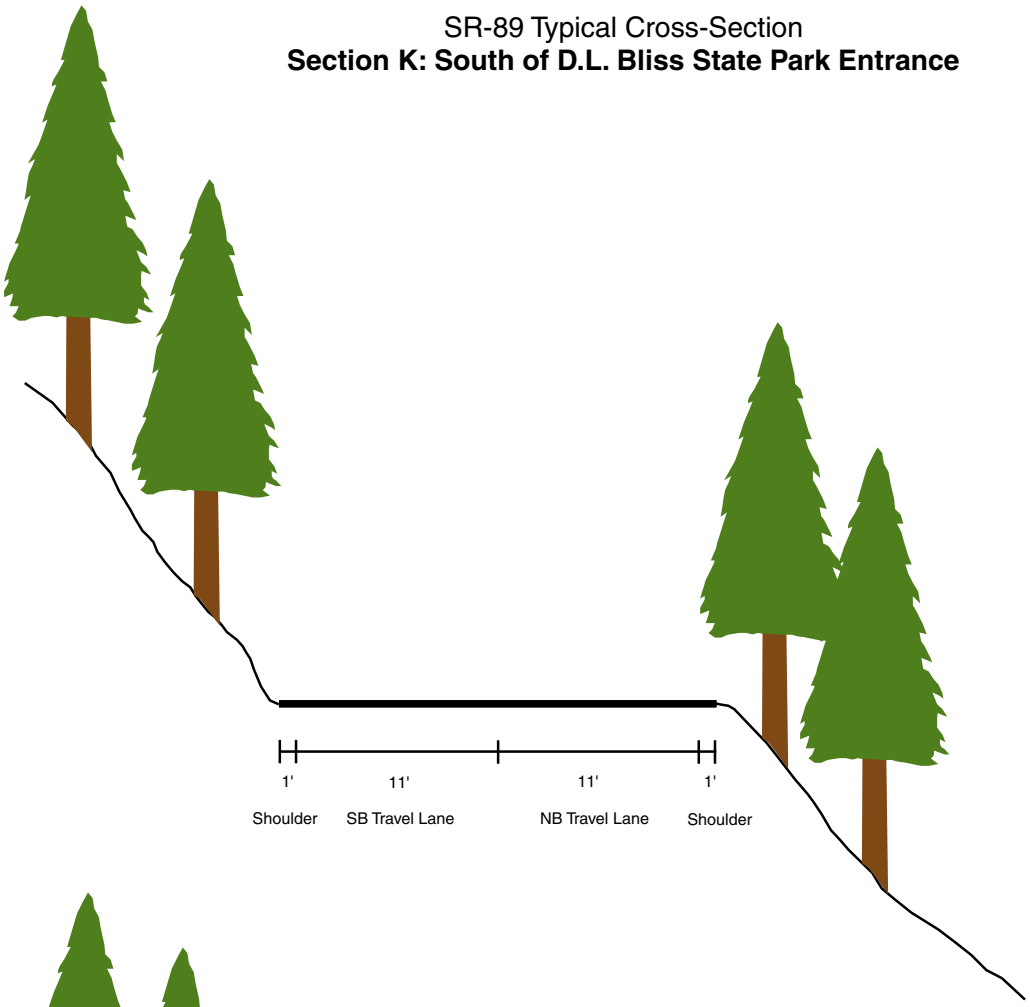


Figure 3-9
Typical Highway Cross-Sections I & J

alta PLANNING + DESIGN



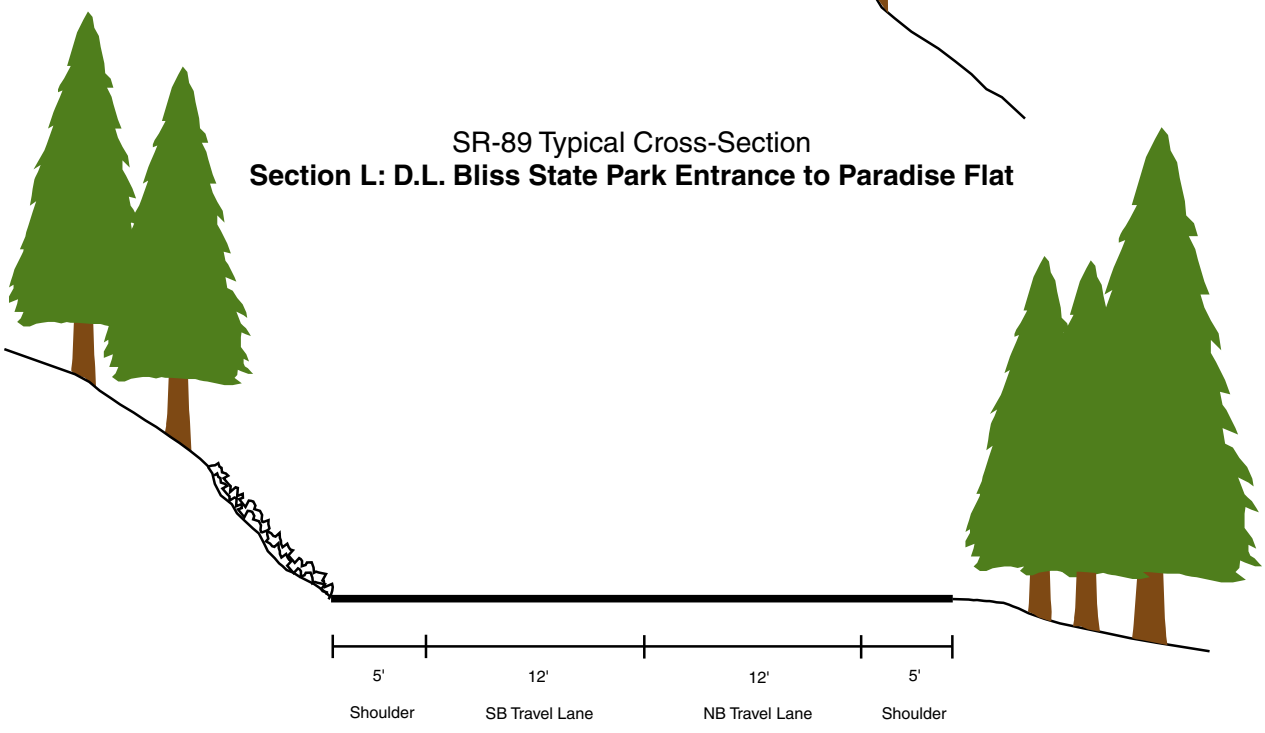
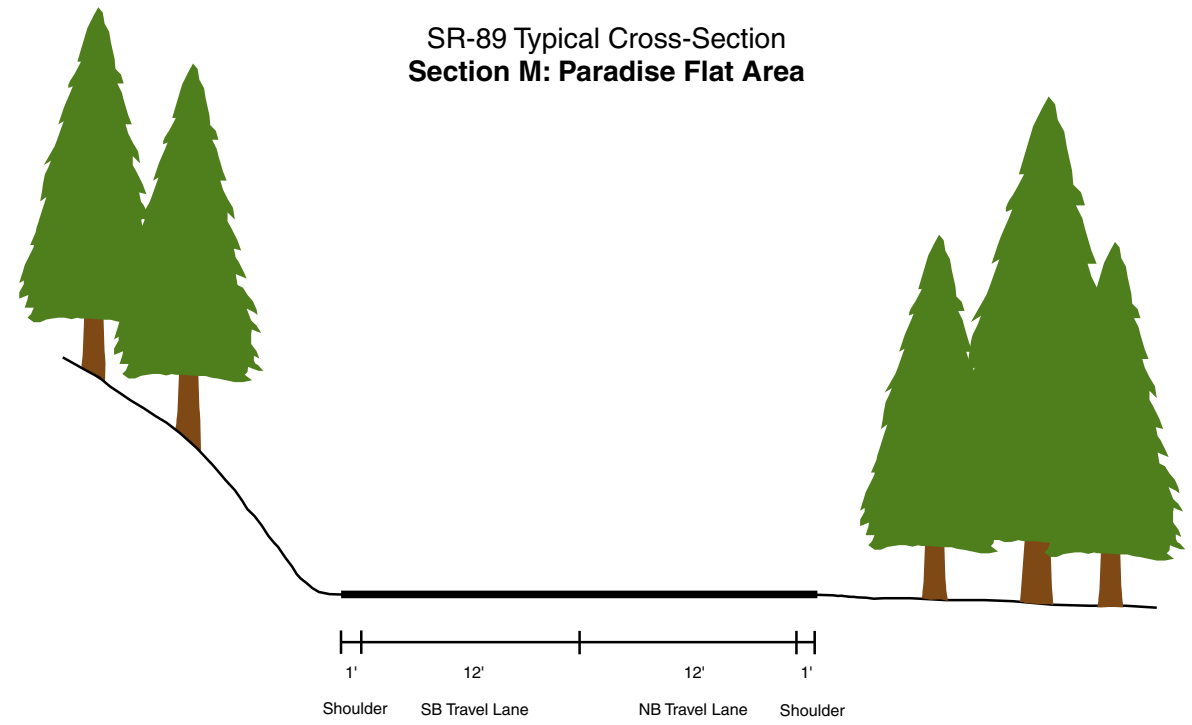


Figure 3-10
Typical Highway Cross-Sections K & L

alta PLANNING + DESIGN



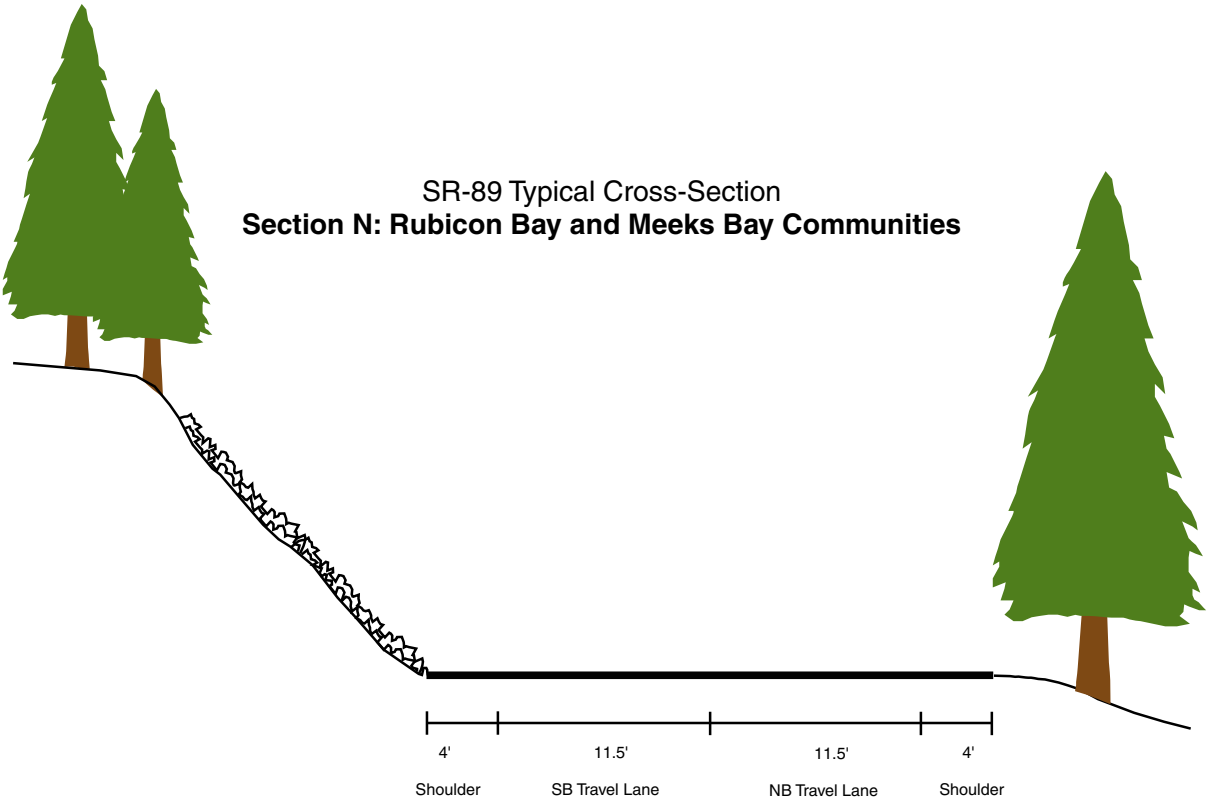


Figure 3-11
Typical Highway Cross-Sections M & N

SR-89 Typical Cross-Section

Section O: Meeks Bay Campground Area

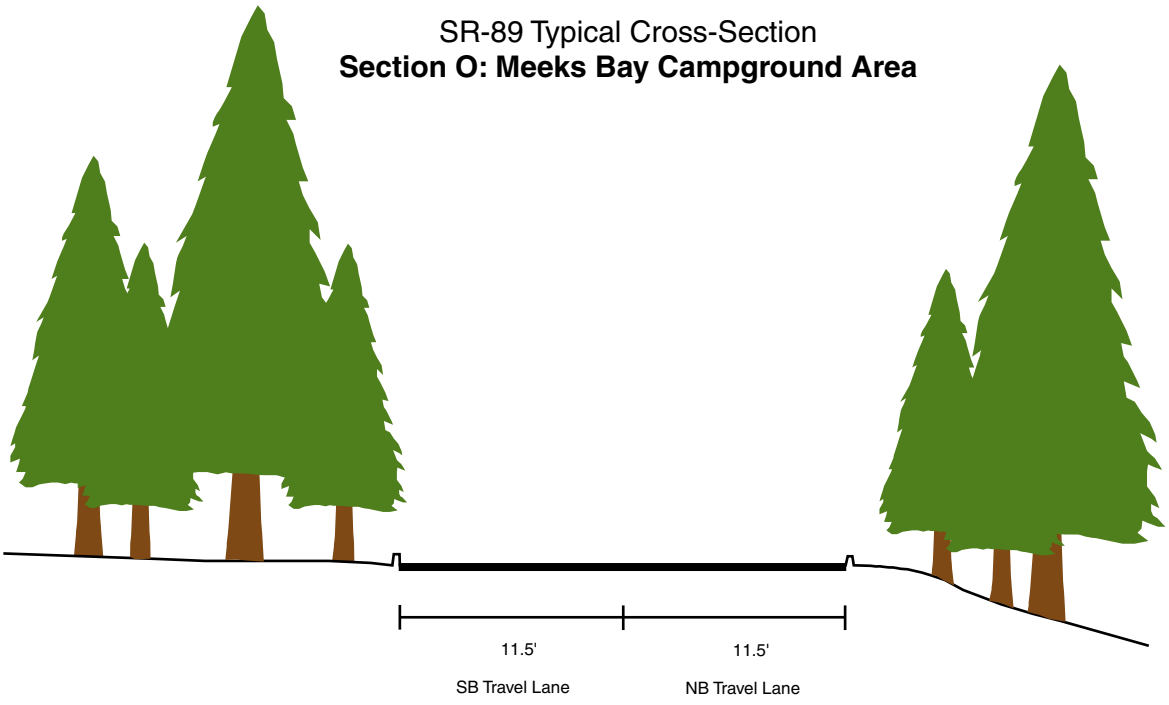


Figure 3-12
Typical Highway Cross-Section O

1. When overtaking and passing another bicycle, vehicle, or pedestrian within the lane or about to enter the lane if the overtaking and passing cannot be done safely within the lane.
2. When preparing for a left turn at an intersection or into a private road or driveway.
3. When reasonably necessary to leave the bicycle lane to avoid debris or other hazardous conditions.
4. When approaching a place where a right turn is authorized.

(b) No person operating a bicycle shall leave a bicycle lane until the movement can be made with reasonable safety and then only after giving an appropriate signal in the manner provided in Chapter 6 (commencing with Section 22100) in the event that any vehicle may be affected by the movement.

Although the Vehicle Code permits a cyclist to leave a bike lane under such conditions, many motorists expect cyclists to remain in the lanes at all times. Along SR-89 within the Cascade to Rubicon Bay corridor, rockfall and other debris is common along the edge of the highway. If bike lanes were installed, it would be expected that they would have to frequently leave the lane to avoid debris, particularly on the upslope (western) side of the roadway.

Consistency of Facility. Due to the fact that there are severely constrained areas of the SR-89 corridor, developing 4 foot bike lanes for the entire length of the corridor will not be possible without major re-engineering of portions of the roadway. If bike lanes were installed under current conditions, there would be areas in which the lanes would abruptly end. A frequent complaint of cyclists are inconsistent bike facilities.

Topography. Bike lanes are not advisable on long, steep downgrades, where bicycle speeds greater than 50 km/h are expected. As grades increase, downhill bicycle speeds will increase, which increases the problem of riding near the edge of the roadway. In such situations, bicycle speeds can approach those of motor vehicles, and experienced bicyclists will generally move into the motor vehicle lanes to increase sight distance and maneuverability. If bike lanes are to be striped, additional width should be provided to accommodate higher bicycle speeds.

Maintenance. Bike lanes require stenciling and signage that would require additional maintenance. Particularly given the snowplowing that occurs on the corridor during winter months, the bike lane stencil paint would need to be re-applied on an annual basis. (As noted above, relatively frequent repainting would likely be required of wide striped shoulders as well, but probably less frequently than stenciled bike lanes).

Urban Feel. In addition to the above issues, some individuals expressed that formal bike lanes were more appropriate as an urban treatment, and did not belong in the scenic Emerald Bay area.

Given the potential negative issues related to bike lanes, it was concluded that wide shoulders would be the desired on-road treatment for SR-89 within the Cascade to Rubicon Bay corridor.

Development in SEZ and Wetland Areas

Segments of the On-Street Bikeway shoulder widening could involve development within SEZ or wetland areas. As discussed earlier in this chapter, specific findings must be made before the Regional Board can grant exemptions to prohibitions against new development or permanent disturbance in SEZs or grant exceptions to the 100-year floodplain discharge prohibitions in cases where the floodplain is not also a SEZ. Please see the discussion under the Off-Street Bikeway alternative for more details on findings that would be required for any On-Street Bikeway development within SEZ or wetland areas.

ALTERNATIVE 3: TRANSIT

OVERVIEW OF ALTERNATIVE

The analysis of Alternative 3, Transit, considered what type of enhancements to the existing local transit system could be implemented in order to accommodate bicyclists through the Cascade to Rubicon Bay corridor. For those cyclists not comfortable riding on SR-89 around Emerald Bay, a bicycle transit service would provide a means of connecting the gap in the bike path system between the West Shore Path and the Pope-Baldwin Path. Two potential transit options are examined: 1) modifying existing transit service to better accommodate bicycles; or 2) providing a dedicated transit service for bicyclists only. Key transit stop locations are shown on the Conceptual Alternatives maps.

OPERATIONAL CONSIDERATIONS

EXISTING SERVICE

The following transit services currently operate along the study corridor.

Tahoe Area Regional Transit and Tahoe Trolley

The Tahoe Area Regional Transit (TART) system is currently operated by Placer County and operates from 6:10 A.M. to 6:30 P.M., seven days a week. The service operates on State Routes 28 and 89 along the northern and western shores of Lake Tahoe, from Incline Village, Nevada on the northeast to Tahoma in El Dorado County on the southwest, and to Truckee via State Route 89. Service is generally provided on hourly headways.

During the summer only, TART operates the Tahoe Trolley service along the northern and western shores of Lake Tahoe along three coordinated routes: Crystal Bay-Tahoe City, Tahoe City-Squaw Valley and Tahoe City-Emerald Bay. Passengers can transfer between north/south segments and east/west segments. Trolleys operate from 10:30 A.M. until 10:30 P.M. seven days per week, with hourly headways. The Emerald Bay route turns around at Inspiration Point, with stops at major park destinations along the highway.

Nifty Fifty Trolley and Emerald Bay Tram

The Nifty Fifty Trolley was established in 1994 and currently operates two routes on the South Shore. Route A runs from Stateline to the South "Y" to Camp Richardson's Resort. Route B runs from Zephyr Cove to Stateline to Heavenly. In conjunction, during the summer season the Emerald Bay Tram runs every half-hour between Camp Richardson and Vikingsholm/Emerald Bay. These services operate June through September, with more frequent headways during the peak months of July and August.

ENHANCING BICYCLE ACCESS

As noted above, the provision of bicycle transit service along the project corridor could involve either modifying existing bus service to accommodate bicyclists, or the provision of a new, dedicated bicycle shuttle along the corridor.

Use of Existing Service

Bicycle racks are currently provided on all TART and Tahoe Trolley buses during daylight savings months (April through October). Most buses are equipped with racks that accommodate two bicycles, with some buses equipped with racks that hold four bikes. During peak summer hours, bike racks are occasionally at capacity and cyclists must wait until the next bus (1 hour headways). TART buses travel as far south as Inspiration Point during summer months.

Bicycle racks are currently not installed on any Nifty Fifty or Emerald Bay trolleys.

In order to provide a complete bicycle transit system along the corridor using existing bus service, bicycle access would need to be provided on the South Shore bus system. Standard front-loading bike racks could be installed on trolley buses, although SS/TMA staff have indicated that this may conflict with the desired aesthetic of the trolley. Approximately cost of a typical front-loading two-bike rack, including installation, is approximately $1,000. If bike racks are determined not to be possible, allowing bicyclists to bring their bikes on board buses is another option. However, during peak summer conditions buses often run at capacity and there would be no way of accommodating bicycles inside the trolley.

Dedicated Bike Transit

As an alternate to the use of existing service, a separate bicycle-only shuttle service could be established along the corridor. Caltrans currently operates a bicycle shuttle service along the San Francisco-Oakland Bay Bridge. The shuttle consists of a passenger van towing a trailer equipped with bicycle racks. Each shuttle can accommodate a maximum of 14 riders and their bikes. These shuttles only operate during weekday commute times (when bicycle access is prohibited on BART trains). Fares across the bridges are $1.00 each way. Such a system could be implemented along the SR-89 corridor between Camp Richardson and Meeks Bay.

As part of a proposed parking shuttle program on the East Shore, LSC Transportation Consultants worked out with the local transit service company that a dedicated bike shuttle would cost on the order of $35.00 per hour to operate. Assuming 12 hours of operation per day over a 100 day

summer season, the operating cost would be around $42,000 per year. Including the cost of the van, trailer, and some stop improvements, a reasonable capital cost would be $50,000.

The service would have to operate between two locations that have adequate available parking for some cyclists to drive to one end, load their bike on the shuttle, and then bike at some other stop. That probably infers a route from Homewood Ski Area on the north to the South Y on the south. With one van, this service would only provide a frequency of one departure every 2 hours.

In terms of recreational cyclist demand for a direct transit trip between the Pope-Baldwin Path and Meeks Bay in order to connect the paths, such demand would be expected to be relatively low. Both the North Shore and the South Shore areas provide many opportunities for an attractive recreational ride, and many cyclists may not be interested in taking an hour-long shuttle ride in order to make a recreational trip on the opposite end of the lake. However, if such a trip were combined with one or more stops at the various destinations within Emerald Bay and D.L. Bliss State Park (Inspiration Point, Eagle Falls, Vikingsholm, Lester Beach), demand would likely be higher.

NEW STOPS

As part of increasing bicycle access along the corridor, for both existing transit service or for a dedicated bike shuttle, new transit stops may be desired. Many logical stopping points are already included in transit service along the corridor, e.g. Camp Richardson, Inspiration Point, Vikingsholm, D.L. Bliss State Park. However, additional stops may be necessary to cater specifically to bicyclists. These might include: Spring Creek Road at the terminus of the Pope-Baldwin Bike Path, Eagle Point Campground, Lester Beach, and Paradise Flat. In particular, locations that may allow cyclists to use transit to avoid a steep hill or other major change in topography may be desired (e.g., a stop at Paradise Flat would permit cyclists who ride south to this point to get to D.L. Bliss State Park without climbing the major grade).

COORDINATION OF SCHEDULE

If existing transit service were equipped with bicycle racks, one important aspect of the program would involve coordination of schedules between the South Shore and West Shore systems. Currently these systems operate on different headways; and a trip between the end of the Pope-Baldwin Path and Meeks Bay would require travel on both systems. Ensuring that a through-cyclist could transfer with minimal waiting time would increase the functionality of this alternative. In addition, shortening headways would likely make the system more attractive and increase demand by other (non-cyclist) users.

NEW BICYCLE AMENITIES

Providing amenities such as bicycle racks at key destinations would be a key component of a successful bike transit program. For example, bicycles are not allowed on unpaved roads within Emerald Bay State Park, and bicyclists wishing to visit Vikingsholm would need a place to lock their bike in the parking lot area. It is important that bike racks be provided at this location, as well as at other transit stops where bicyclists may want to leave their bikes to explore a visitor destination.

LIMITING PARKING IN EMERALD BAY

One variable in the success of a transit system through Emerald Bay is the availability of vehicle parking in the area. Regardless of an improvement in transit headways or additional stops in the area, many visitors will continue to choose to drive to Emerald Bay if they believe there will be available parking in proximity to their destination. During the Technical Advisory Committee meetings, there were suggestions of completely overhauling the current Emerald Bay parking scenario, to eliminate short-term public parking and require the use of transit to access day-use areas such as Vikingsholm. One model recreational transit system noted was the US Forest Service's shuttle to Devil's Postpile National Monument in Mammoth Lakes, California. The Devil's Postpile Shuttle is mandatory for all visitors between June and September, (with a few exceptions, including persons with disability placards). One key difference between the Devil's Postpile area and the Emerald Bay area is that Devil's Postpile is located at the end of a narrow, single-lane road that does not experience any through-traffic.

It is beyond the scope of this Bikeway Study to evaluate the impacts of eliminating parking within the Emerald Bay area. This project would require large parking/staging areas on both the north and south ends of Emerald Bay where visitors could leave their vehicles and transfer to a shuttle. Obviously, through-traffic would still be permitted on SR-89 for travelers heading between destinations north and south of Emerald Bay. Given this, there would be an incentive for short-term visitors to circumvent the shuttle requirement entirely. It is likely that this arrangement would increase the incidence of drive-through visitation, with people just pulling off the road for a quick view or photo opportunity. A concerted effort would need to be made to discourage short-term roadside parking, so that all through-traffic were kept moving through the area This could involve the provision of a short-term parking/viewing area, with a strictly enforced time limit on parking, for visitors who only wanted a brief viewing opportunity and did not want to visit the park for an extended time.

Prior to any substantial limitation of parking within Emerald Bay, a detailed parking and traffic study would need to be conducted.

ALTERNATIVE 4: WATER FERRY

OVERVIEW OF ALTERNATIVE

Another alternative to aid bicycle travel through the corridor could be to operate a waterborne ferry shuttle service that allows cyclists to avoid the most physically challenging segments of the corridor. Water ferry service within the Emerald Bay area has been referenced in historical TRPA documentation, although no detailed plans for such service have been prepared to date.

Optimally, a bicycle ferry service within the study area would provide a waterborne link as an alternative to bicycle travel from the northern portion of D.L. Bliss State Park to Cascade Creek. However, in reality the potential service would be substantially constrained by the availability of adequate shore facilities.

Currently, there are examples of bicycle-specific water ferry operations in the United States. In Vermont, the Winooski Bike Ferry links two sections of a rail-trail north of Burlington. A local non-profit operates the service, running a standard pontoon boat for the ferry. The Winooski ferry operations are funded by boarding fees, donations, and a grant from the Vermont Department of Transportation. In Marina Del Rey California, a pilot program was undertaken in late Summer 2002 to operate a ferry across the mouth of the marina to link two sections of the coastal bike path. The Marina del Rey project was completely funded by a grant, and did not charge for boardings. Both ferry operations reported successful ridership. One key difference between these two examples and the study area is the length of trip, as the Cascade to Rubicon Bay corridor is a much longer distance.

The remainder of this section discusses major operational consideration for a water ferry alternative for the SR-89 Bikeway.

OPERATIONAL CONSIDERATIONS

POTENTIAL DOCKING LOCATIONS

A comprehensive review of potential ferry service shore facility locations was recently conducted as part of the Hornblower Charter Service Traffic and Parking Study (LSC, 2000). A summary of potential facilities along the West Shore between Tahoe Keys Marina and Homewood is presented in **Table 3-1, Summary of Allowable West Shore Potential Ferry Facility Sites**. In addition to these facilities, the US Forest Service constructed a pier at the Valhalla Historic Site in summer 2002 that could accommodate a shallow-draft passenger vessel.

Use of the Sugar Pine Point State Park pier near Ehrman Mansion for any service with landside passenger access (auto or otherwise) is currently against State Park policy. Given the

The Meeks Bay Marina is not currently noted as an allowable ferry site, although based on a conversations with the marina operator it does appear that the marina would have the potential to accommodate a small watercraft. The marina is constrained by the depth of the inlet channel, as well as the small size of the marina which makes it difficult to turn around larger vessels. New docking/pier facilities would be required, and these facilities would need to be constructed in a way that does not interfere with the existing boat launch. The development of any ferry landing facilities at Meeks Bay would require environmental review, permitting from TRPA, and coordination with the Washoe Tribe which operates the Marina. However, based on its key location at the north end of the Bikeway Study corridor, as well as the availability of parking and services at the resort, Meeks Bay is considered a desirable northern docking location for the a Waterborne Ferry alternative.

On the south end, Camp Richardson would be a desirable docking location, due to its proximity to the Pope-Baldwin bike path, availability of some nearby parking, and services at the resort area. It bears noting that the operator of Camp Richardson currently does not allow the major charter boat operator on Lake Tahoe to use the Camp Richardson pier; if this condition were to remain in effect for a bicycle ferry service, the next potential location would be at Valhalla, nearby. As with use of the Meeks Bay Marina, use of the Camp Richardson pier for the Ferry alternative would require

environmental analysis, TRPA permitting, and coordination with the operator of the Camp Richardson Resort. .

Assuming that environmental and permitting issues can be resolved, a one-way ferry trip between Meeks Bay and Camp Richardson would cover a distance of roughly 10 miles. Due to the docking constraints at both Camp Richardson and Meeks Bay, a full-size ferry boat is not anticipated to be able to run between these locations. Instead, a smaller vessel such as a pontoon boat or modified speedboat would be the most likely type of boat used, resulting in slower operating speeds than a large high-speed ferry. Assuming an average operating speed of 15 mph, this trip would have a one-way running time of approximately 40 minutes. Including time for boarding/deboarding, service departing from each pier once every two hours could be provided.

Table 3-1
Summary of Allowable West Shore Potential Ferry Facility Sites

Facility	Limitations on Summer Use to Ensure Adequate Parking and Traffic Conditions	Shuttle Bus Parking
Ski Run Marina	Auto access only if shuttle service provided to Upper Ski Run Blvd. parking area and ferry	Upper Ski Run Boulevard Parking available
Timbercove	Charters with auto passenger access only if beginning and ending between 9 AM and 5 PM. During peak seasons, exiting traffic generated by auto passenger access limited to right-turn only onto US 50.	On-site parking available 9 AM to 5 PM in summer and winter, all hours in off-seasons.
Tahoe Keys	No auto passenger access	Off-site parking required in summer.
Camp Richardson	No passenger access via car. Traffic control officers must be provided at SR-89/Jamison Beach Road for all charters ending between 11 AM and 5 PM.	On-site parking available, but not near marina.
Vikingsholm	Destination only – No landside access	--
Sugar Pine Point State Park	Destination only – No landside access	--
Chambers Landing	No auto passenger access	Off-site parking available at Homewood
Homewood	No limitations	Parking available, except on peak ski days

Source: LSC Transportation Consultants

At both ends of this potential ferry trip, there is no available parking for use by ferry passengers. Ferry passengers would therefore need to be limited to persons arriving without a car, which would be a very difficult restriction to enforce. One option would be to only allow boarding by persons bringing a bicycle. However, this would not preclude persons from parking in nearby neighborhoods or along highways and simply bringing their bike to the ferry dock. In addition, this condition would preclude other non-motorized travelers (such as hikers) from using the service. Restricting ferry ridership to those not parking nearby is probably not a possible alternative.

Reviewing Table 3-1, the shortest ferry trip that could potentially be provided between existing pier locations with parking available for ferry passengers would be between Timbercove Marina on the south and Homewood on the north. At Timbercove Marina, parking is only available for ferry passengers during the period of the day when relatively few parking spaces are required by the Timbercove Lodge (9 AM to 5 PM). Because existing docking facilities at Timbercove and Homewood allow larger watercraft, this service could be provided by a full-size ferry. This route would be approximately 14 miles in length, and would provide departures from each pier roughly every one hour and 20 minutes.

A reasonable schedule for this service is presented in **Table 3-2, Potential Bicycle Ferry Schedule**. In addition to meeting the limitations on parking at Timbercove, this schedule would also allow the vessel to be operated with one crew shift. It also begins and ends at the South Shore, which minimizes the cost of the service as the boat would probably be serviced and stored overnight on the South Shore.

Table 3-2
Potential Bicycle Ferry Schedule

Depart Timbercove Marina	Arrive Homewood Marina	Depart Homewood Marina	Arrive Timbercove Marina
9:00 AM	9:35 AM	9:40 AM	10:15 AM
10:20 AM	10:55 AM	11:00 AM	11:35 AM
11:40 AM	12:15 PM	12:20 PM	12:55 PM
1:00 PM	1:35 PM	1:40 PM	2:15 PM
2:20 PM	2:55 PM	3:00 PM	3:35 PM
3:40 PM	4:15 PM	4:20 PM	4:55 PM

Source: LSC Transportation Consultants

In light of the extent of the summer tourist season, a reasonable season for this service would be operation from the last weekend in June through the Labor Day weekend, or approximately 70 days per year (depending upon when Labor Day falls on the calendar). For purposes of this study, it is assumed that a passenger boat with a capacity of approximately 30 persons (with bikes) is adequate.

CAPITAL COST

Depending upon the specific characteristics of the vessel (speed, air pollution abatement equipment, furnishings, etc.), a reasonable cost for 30-passenger vehicle is approximately $300,000.

OPERATING COST

A major commercial tour boat operator on Lake Tahoe indicated that an hourly cost on the order of $60 per hour is a reasonable estimate. This costs reflects operation of a 30-passenger, shallow draft vehicle, with a crew of two. In addition, docking fees are typically charged use of private facilities that range from roughly $500 per month and up. Roughly $5,000 per year would also need to be budgeted for administration and marketing. Finally, insurance costs are on the order of $10,000 per year.

Over the course of the operating season, the schedule above would require approximately 630 hours of operation, incurring an operating cost of roughly $38,000 per year. Including $10,000 for insurance, $5,000 for administration/marketing and $3,000 for docking fees ($500 per month times two docks times 3 months), this program would require an operating budget of roughly $56,000 per year.

RIDERSHIP

The following can be considered in assessing potential ridership on this service:

- If used to full capacity, the service could accommodate a total of 180 passenger round-trips per day, or 360 one-way passenger-trips
- It is known that a "water taxi" service between Camp Richardson and Ski Run Marina operated by Hornblower Cruises several years ago generated only low ridership.
- Ridership would be influenced greatly by both public awareness and fare levels.
- Considering that this service is intended as a public amenity (rather than as a money-making enterprise) a one-way fare of $3.00 is assumed. Even at this relatively low fare, a family of four making a round trip would incur a total cost of $24.
- At this fare level and assuming that the service is open to all (not just cyclists), a reasonable peak-day ridership figure would be half of total capacity, or 180 one-way trips.
- Ridership patterns for the existing Nifty Fifty Trolley service, which operates a visitor-focused service over a very similar season, indicates that average daily ridership is roughly 75 percent of peak daily ridership. This indicates that average daily ridership on the bicycle ferry service would be 135 one-way trips per day.

Multiplying by 70 days per season, annual ridership would be roughly 9,500.

SUBSIDY REQUIREMENTS

At $3.00 per trip and the ridership level identified above, roughly $28,000 in fares would be collected over the course of a season. Subtracting these fares from the annual cost of $56,800 yields an annual subsidy requirement of $28,000.

ALTERNATIVE 5: SCHEDULED ROAD CLOSURE

OVERVIEW OF ALTERNATIVE

One proposal that has been advanced to provide a bicycling amenity in the corridor would be to close a portion of SR 89 to general public traffic on a consistent scheduled basis, in order for bicyclists and other non-motorized recreational travelers (in-line skaters, etc.) to use the roadway with little or no interference with traffic.

If implemented, of course, the details of such a closure would require review and discussion among a wide range of groups and agencies, such as Caltrans, the local Sheriff and Fire Departments, State Parks, USFS, landowners, etc. For purposes of this analysis, however, the following operational characteristics have been developed as a means of providing a meaningful amenity to bicyclists, while minimizing other impacts.

- To generate significant benefit among bicyclists, the closure would need to occur on a weekend day. Traffic counts were conducted by LSC Transportation Consultants, Inc. by placing a pneumatic road tube counter across SR-89 at the north end of Emerald Bay (specifically, at the winter snow closure gate). These counts were conducted from Friday, July 5 through Tuesday, July 9th. As this period was part of the long 4th of July weekend, they represent peak tourist conditions, and typical summer weekend traffic levels are expected to be lower. Traffic volumes were highest on Saturday (7,657), and substantially lower on Sunday (4,988). Therefore, it is assumed for this analysis that the closure would occur on Sundays (due to the fact that it would affect less traffic).

- For both bicyclists and motorists to be able to easily remember when the closure is to occur, it would need to occur on a consistent basis. It is assumed for this study that the closure would be scheduled for the first Sunday of each month during the peak tourist season, meaning June through September (i.e., Memorial Day through Labor Day).

- Identifying the length of time that the roadway is closed requires a balancing between the desire to provide a useful program for bicyclists, and the need to minimize impacts to motorists. On one hand, the program to be effective should provide an adequate length of time for a group of bicyclists to make a round-trip through the corridor, as well as to make a stop along the way (such as to visit Vikingsholm). On the other hand, it would be beneficial to avoid impacting any commuter traffic in the early morning hours, and also to provide adequate time during daylight hours for motorists to still visit Emerald Bay on the closure days. This would minimize the impacts of the program on both visiting motorists and on merchants and lodging owners dependent on motorists. On balance, a six-hour closure from 8:00 AM until 2:00 PM would allow commuters to travel through the corridor and allow motorists to visit Emerald Bay, while still providing bicyclists with an enjoyable outing.

- It is probably infeasible for the closure to "trap" motorists camping at either D.L. Bliss State Park on the north or Emerald Bay State Park on the south. Assuming that access to D.L. Bliss could be provided during the closure period via Lester Beach Road on the northern end of the park rather than the normal access roadway, the closure section would extend from the Lester Beach Road on the north to the Eagle Point Campground access road on the south. This is a distance of roughly 5.4 miles. Land uses that would be inaccessible to motorists during this period consist of the Vikingsholm, Eagle Falls, and Inspiration Point vista points/trailheads, as well as the two USFS summer home tracts on the north side of Emerald Bay.

- The following motor vehicles should be allowed to enter the closure section:

- Emergency and public safety vehicles, such as CHP, fire department, sheriff department, search and rescue, and ambulances.

- USFS and State Park vehicles.

- Nifty Fifty Trolley service south of Emerald Bay and TART Trolley service north of Emerald Bay. Together, these services provide the only public transit connection between the North Shore and the South Shore.

- Lessees of the USFS summer homes. A permit system would be required, in which one or two numbered permits are distributed to each lessee, along with a flyer discussing the closure and auto use restrictions.

For these motorists, it is recommended that a lower speed limit (such as 25 mph) should be imposed, excepting emergency (siren on) conditions.

- To effect the closure, the following steps would be required:

  - The state highway at either end of the closure would need to be closed with gates or barricades, and staffed at all times. The staff would be required to ensure that only authorized motorists are allowed to pass, and also to instruct motorists as to when the closure will end and legal parking areas.

  - Signage would need to be put in place at the three major internal parking areas (Vikingsholm, Eagle Falls, and Inspiration Point) to inform motorists that parking after 8 AM on the day of the closure is illegal. Flyers would need to be placed under the windshield of vehicles parked at these locations and elsewhere along the corridor indicating that use of the state highway is illegal until 2 PM. To provide some level of egress for these motorists, law enforcement vehicles could potentially be used to "caravan" general public vehicles out of the area at several times over the closure period.

  - Signage would need to be installed and maintained at locations along SR 89 well in advance of the closure locations, such as in Tahoe City, Homewood, Tahoma and Rubicon Bay to the north, and South Lake Tahoe and Camp Richardson to the south.

OPERATIONAL CONSIDERATIONS

EXISTING TRAFFIC ACTIVITY PATTERNS

As mentioned above, traffic counts were conducted by LSC Transportation Consultants, Inc. at the north end of Emerald Bay Friday, July 5 through Tuesday, July 9. Based on these counts, it was concluded that traffic activity is largely concentrated between approximately 8:00 AM and 7:00 PM. Peak traffic levels occur during the mid-afternoon period. Rather than the distinct morning and

afternoon peaks characteristic of roadways with significant commute traffic, this pattern reflects the large proportion of motorists on SR-89 that are visitors on recreational trips.

Additional information regarding traffic patterns in the area was collected by the TRPA with assistance by LSC as part of a transit study for Emerald Bay and Fallen Leaf Lake, conducted in 1998. As summarized in the Emerald Bay / Fallen Leaf Lake Data Analysis Report (LSC, April 8, 1998), a survey was conducted of motorists parking at both Inspiration Point and Vikingsholm, by placing mail-back postcard surveys under their windshield wipers. At total of 147 surveys were obtained from these areas, that indicated the following:

- 65 percent of respondents were visitors staying overnight in the Tahoe area, while virtually all of the remaining 35 percent were day visitors.

- "Sightseeing" was identified as the trip purpose for 43 percent of all respondents, while 36 percent indicated hiking/biking as their trip purpose.

- There were an average of 3.3 persons per vehicle.

- The average length of stay in the Tahoe Region was identified as 4.6 hours for day visitors, and 2.6 days for overnight visitors. This latter figure, coupled with the high proportion of overnight visitors, indicates that most visitors could plan their stay in the Tahoe Region to avoid a one-day road closure.

- 73 percent of respondents had visited the area previously.

- Of all respondents, 20 percent indicated that they were planning a complete trip around Lake Tahoe on the day they were surveyed. No data was collected on the proportion of other respondents heading through the area versus return the direction in which they arrived.

NON-MOTORIZED USE LEVELS

To our knowledge, there is not an existing instance of a state or U.S. highway that is closed on a consistent scheduled basis for use as a recreational travel corridor. There are examples of highways that are closed for special events (such as the closure in one direction each year of SR 89 for the Lake Tahoe Marathon for four to six hours on one day), as well as examples of new roadway facilities that are opened to bicycle use for a few days prior to opening for use by motorized traffic. Establishment of a scheduled, consistent closure of a state highway, however, would be without precedence. It is therefore difficult to estimate how much use the closed facility would generate, as there are no comparable examples to consider.

The following factors would impact the use levels of the facility:

- Even without the potential for conflict with motorized traffic, the steep grades along the roadway would substantially limit use by families with younger children.

- Usage would undoubtedly be largely a factor of the public's awareness of the closure program.

- A rough comparison can be drawn between usage levels of other Class I bicycle facilities in the Tahoe Region and SR-89 when closed. Daily facility use data in the Region is limited (for instance, no such data is provided in the Lake Tahoe Bicycle and Pedestrian Master Plan.) A survey of TCPUD trails conducted in the summer of 1994, however, provides some useful daily trail use data. As summarized in the TCPUD Bicycle Trail User Survey (LSC, 1994), a twelve-hour count of the three trails entering Tahoe City over a peak summer day indicated that 842 users were observed on the Truckee River Trail, 696 users were observed on the West Shore Trail, and 420 users were observed on the North Shore Trail. These figures included any double-counting of individuals passing the survey points more than once.

Considering these use figures, the grades found on the SR-89 closure section versus the characteristics of the various TCPUD facilities, and the high awareness that closure of SR-89 would undoubtedly generate, a reasonable use estimate of 500 cyclists could be expected over the course of a peak closure day.

POTENTIAL IMPACTS

Impact on Traffic Patterns

The total traffic impacted by the potential closure would be greater than the traffic activity at any one point. Specifically, motorists visiting from both the north and the south that return in the direction from which they came would be impacted, as well as through motorists. It is estimated based upon the survey discussed above, available traffic counts, as well as informal observation, that one-half of the traffic entering the Emerald Bay area from the north returns to the north, while two-thirds of the traffic entering the area from the south returns to the south. Based upon these factors and traffic volumes observed in both the LSC counts as well as Caltrans counts, and adjusting for traffic activity between the closure points and the nearest Caltrans count locations, it is estimated that over a summer Sunday a total of 4,506 motorists make trips that would be impacted by the closure. Of this total, 62 percent would consist of motorists return the direction in which they arrived (both to/from the north and the south), and the other 38 percent would be through motorists.

It is estimated that 2,009 of these total motorists over the day would be impacted in the 8 AM to 2 PM closure period. Of these impacted motorists, an estimated 1,187 are those returning the way they arrived, and the remaining 822 are through motorists.

How these motorists would modify their trip-making in response to the closure is impacted by a number of factors. In general, motorists returning from the direction they arrived can be expected to do one of three things: eliminate their trip entirely, shift to another travel mode (transit, bicycle,

or pedestrian), or shift the time of their trip. Through motorists can be expected to respond by eliminating their trip, changing their trip time or day, or traveling via the East Shore.

The proportions of the two types of motorists that would have the various responses is impacted by a variety of factors:

- A large proportion of total trips in the corridor are "discretionary" trips, rather than non-discretionary trips such as work trips or delivery vehicles. A large proportion therefore have substantial discretion on when they travel, or even if they travel.

- Trips via the East Shore during the summer can take 30 to 60 minutes longer than existing trips on the West Shore, depending upon specific trip origin and destination. There is therefore a substantial "penalty" in deciding to continue to complete a trip via the longer route.

- As discussed above, a majority of motorists stopping at the parking areas in Emerald Bay consist of visitors staying for two or more days. It therefore would be relatively easy for most motorists to eliminate their trip entirely on the day of the closure, and simply schedule their trip to the Tahoe Region to visit Emerald Bay on another day.

- With advanced knowledge, it can be expected that a relatively high proportion of motorists that would otherwise travel the corridor between 8:00 AM and 9:00 AM would simply travel in the hour prior to the 8:00 AM closure. Similarly, motorists that would otherwise travel the corridor between Noon and 2:00 PM would largely plan their day to travel after 2:00 PM. In particular, many motorists wishing to make through trips in the hour prior to the end of the closure would find it faster to simply wait for the closure to lift, rather than to drive the East Shore.

- The proportion of motorists diverting to other modes is expected to be relatively low, due to (1) the challenge associated with walking or bicycling the corridor (with the exception of those camped in the Eagle Point Campground, who could relatively easily substitute a walk trip to Emerald Bay for an auto trip), (2) the very limited capacity of the existing transit services.

Considering all of these factors in total, the proportions identified for the various responses were developed. When multiplied by the total number of motorists in the two types, the total shifts in travel patterns is identified. It is estimated that a total of 1,170 motorists would react to the closure by shifting their travel time, 599 motorists would eliminate their trip entirely (at least on the day of the closure), 214 motorists would divert to the east shore, and the remaining 48 motorists would divert to other travel modes.

In reviewing these figures, the traffic impacts associated with diversion to the East Shore (SR 28 and US 50) can be expected to be relatively minor, as these volumes would be distributed over the closure period and the volumes are small in comparison with the available capacity of the East Shore

roadways. The more problematic traffic impact would occur due to motorists shifting their travel times. While most of these motorists that would otherwise travel during the first hour of the closure could be expected to simply shift their travel time one hour earlier (into a period with relatively low existing traffic volumes), a large proportion of motorists wishing to travel between 9:00 AM and 2:00 PM who respond to the closure by shifting their travel time would shift to the hours just after the end of the closure. Traffic volumes in the 2:00 PM hour can be expected to increase from a non-closure level of roughly 520 vehicles (total in both directions) to approximately 1,170 vehicles. Considering the interaction of parking vehicles, pedestrians, and through volumes, this volume probably exceeds the capacity of the roadway, particularly to the south of Vikingsholm. As a result, extensive traffic queues and delays would occur over the hour or two after the end of the closure.

Impacts on Parking

As evidenced by the vehicle parking observed at the ends of existing Class I facilities in the region (such as along SR 89 at the south end of the Class I trail through Camp Richardson, or at the 64 Acre Parcel at the end of the Truckee River Trail in Tahoe City), many bicyclists elect to drive to the beginning of an attractive bicycle facility. It can be expected that this pattern would also occur with closure of SR 89. Therefore, a substantial amount of vehicle parking could be expected to be generated wherever the closures are located.

This impact can be estimated by factoring the total usage estimate presented above by the following factors:

- Based upon existing population and lodging figures, 60 percent of the use would come from the South Shore, and the remaining 40 percent from the north shore.

- An estimated 50 percent of all cyclists using the closure section would drive to the area, and the remaining 50 percent would cycle or take bikes-on-transit. (In comparison, the TCPUD surveys indicated that 35 percent of TCPUD trail users drove to the trails. As the SR-89 closure area is more remote, the proportion driving would be higher).

- Per the TRPA TRANPLAN model data, the total number of users arriving by car can be divided by an average recreational vehicle occupancy of 3.1 persons per vehicle, to identify the number of vehicles arriving at either end of the closure.

- As the closure period is assumed to be relatively short, it is assumed that all user vehicles are parked at the closure points at the peak time.

Using these factors, it is estimated that up to approximately 60 vehicles would be parked at the south closure, and up to 40 vehicles at the north closure. In reality, parking for these numbers of vehicles is not physically available at either closure location. The closest location that could reasonably accommodate this additional parking demand on the south end would be the existing Sno-Park location off of Cathedral Road, while on the north end the closest location would be shoulder and lot parking along internal park roads in Sugar Pine Point State Park. Barring an extraordinarily aggressive parking enforcement program, in actuality this parking would occur along the SR 89

shoulder and residential streets in the Rubicon Bay area on the north, and along the SR shoulder, Cascade Road shoulder, and USFS facilities on the south.

In addition, vehicles would be parked by motorists simply waiting for the end of the closure period. While there are some segments of roadways approaching both ends of the corridor with sufficient shoulder for vehicles to park out of the travel lane, there are also other segments without sufficient shoulder. It can be expected that motorists waiting for the 2 PM end of the closure would queue in the approaching travel lanes, particularly after 1 PM or so, when waiting for the end of the closure would be quicker than driving around the East Shore of the lake. A reasonable estimate of this pattern, based upon the analysis of traffic response to the closure discussed above, would be 140 vehicles queued in the northbound direction at the south closure, and 170 vehicles queues in the southbound direction at the north closure. At an average of 30 feet per vehicle, this queue would be on the order of 0.8 miles long on the south (northbound), and 1.0 miles long on the north (southbound). This queue would block access to the closure point, for all but emergency vehicles moving in the oncoming lane, as well as access to the various Ring Roads and Bliss State Park on the north and to Cascade Road and Eagle Point Campground on the south.

Impact on Emergency Access

While the ability of emergency and public service vehicles to pass through the closure points would minimize the impact of the closure for most of the closure period, the long queues of cars in the inbound lanes during the last hour or so prior to closure would substantially reduce emergency response. As some general public traffic would still be using the outbound lane adjacent to the inbound queue (generated by inbound drivers deciding to turn around, as well as persons existing the state parks near the closure points), use of the oncoming lane by emergency response vehicles for these long distances could be potentially hazardous. In addition, the traffic congestion for the hour or two after the end of the closure would also slow emergency response.

Impact on Private Land Access to the Corridor

Property owners and USFS leaseholders would be provided access through the closures. However, the long queues of traffic waiting for the closure gates to open would effectively block access for roughly an hour prior to the end of the closure, both for those persons bound to properties within the closure corridor as well as those persons with access within roughly 1 to 1.5 miles of the closure points.

SAFETY CONSIDERATIONS

Given the steep grades of SR-89 through the Emerald Bay corridor, it is possible that a recreation-oriented road closure could result in safety hazards and conflicts between bicyclists and pedestrians. With the road closure in effect and no possibility of conflicts with automobiles, it is likely that many cyclists descending in either direction from the Inspiration Point area would be tempted to "take the lane" and descend at a high rate of speed. Particularly on the long, relatively straight descent between Inspiration Point and Eagle Falls where there is ample sight distance, unchecked downhill bicycle speeds could exceed 40 mph. Heading from Inspiration Point toward the Eagle Point campground entrance, bicycle speeds would not likely be as fast due to the sharp switchbacks and limited sight distance. With pedestrians sharing the roadway lane during closure periods, there is a possibility of conflicts and collisions between high-speed bicyclists and pedestrians. Pedestrians

using the roadway lane, particularly children, may be poor judges of how fast cyclists are descending, and accidentally get in their way.

If the road closure idea were to be pursued, some regulatory solution to this problem would need to be implemented. Pedestrians would need to be advised to walk near the edges of the roadway, and to avoid crossing the roadway at blind curves. Bicyclists would need to be given a maximum speed limit on descents, perhaps in the range of 25 mph, so that they could operate safely with pedestrians. Strict radar enforcement of these speed limits on descents (by Highway Patrol or State Park Rangers) would ensure compliance. Both pedestrians and bicyclists would need to be advised to be alert for other users on the roadway, and to be alert for law enforcement, emergency, landowner, or other vehicles that would be permitted to use the corridor during closure periods.

CALTRANS POLICY ON HIGHWAY CLOSURE

In addition to the above operational considerations, it is important to note that Caltrans does not consider the closure of SR-89 to vehicular use as a viable bikeway alternative. Exceptions for highway closures are limited to accidents, construction, maintenance, or weather-provoked conditions.

REFINEMENT OF CONCEPTUAL ALTERNATIVES

Following completion of the environmental, transportation, and engineering analysis, and presentation of the results to Caltrans staff and the TAC, the Conceptual Bikeway alternative were refined further based on those findings. As part of this refinement process, an Alternative Evaluation Matrix was prepared which presented the relative positive and negative benefits of each Conceptual Alternative. This matrix allowed staff and TAC members to compare and weigh the relative impacts of each alternative. The completed evaluation matrix is shown in **Table 3-3**.

The refined alternatives maps, shown in **Figures 3-13, 3-14, 3-15, and 3-16** on the following pages, reflect modifications made to the conceptual alternatives to avoid significant environmental, engineering, operational, or other impacts. The refined alternatives were used in preparation for selecting the Preferred Alternatives (discussed in chapter 4).

ALTERNATIVE 1: OFF-STREET BIKEWAY

From an engineering perspective, it would be possible to construct a paved bike trail from Spring Creek Road, around Emerald Bay, and north to Meeks Bay. However, such construction would have substantial environmental impacts, the need for major cut/fill, water quality/erosion, potential disturbance of special-status plant and wildlife species, construction in wetland and SEZ areas, and major visual quality impacts. It was concluded by the TAC that this conceptual alignment would result in too many impacts and should not be given further consideration as part of the bikeway study.

North of Emerald Bay, it was concluded that the conceptual alignment along the shoreline should also be removed from consideration, due to the same impacts discussed above. However, north of

Table 3-3
Conceptual Alternative Evaluation Matrix

KEY TO RANKING SYMBOLS

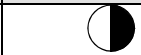
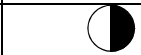
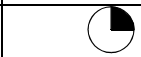
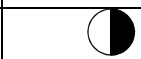
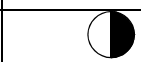
A Strong Negative Impact 

B Negative Impact 

C No Discernible Impact or Benefit 

D Beneficial Impact 

E Strong Beneficial Impact 

Impacts		Conceptual Alternative Number/Name				
		1 Off-Street Bikeway	2 On-Street Bikeway	3 Transit/ Shuttle	4 Water Ferry	5 Scheduled Road Closure
Negative Environmental Impacts	Biological Resources					
	Cultural Resources					
	Soils and Geology					
	Water Quality					
	Visual Quality					
	Traffic					
	Increase Visitor Load on Emerald Bay State Park					
Positive Environmental Impacts	Reduce Vehicles Trips					
	Reduce Parking Impact at Emerald Bay					

Impacts		Conceptual Alternative Number/Name				
		1 Off-Street Bikeway	2 On-Street Bikeway	3 Transit/ Shuttle	4 Water Ferry	5 Scheduled Road Closure
Implementation	Cost	○	◔	◔	◔	◔
	Ease of Implementation/ Planned Improvements	○	●	◔	◑	○
	Private Property	○	◑	◑	◑	◑
Functionality	Connectivity	●	◔	◔	◔	◔
	Transportation	●	◔	◔	◔	◑
	Recreation	●	◔	◔	●	●
	Access to Destinations	●	◑	●	◔	◔
	Seasonality	●	◑	◑	◑	◑
User Groups	Expected Level of Use	●	◑	◑	●	●
	Appeal to Road Cyclists	◔	●	◔	◔	●
	Appeal to "Family" Cyclists	●	◔	◔	●	●
	Appeal to Commuters	◔	●	◔	◔	◑

Impacts		Conceptual Alternative Number/Name				
		1 Off-Street Bikeway	2 On-Street Bikeway	3 Transit/ Shuttle	4 Water Ferry	5 Scheduled Road Closure
Other Necessary Components	New Parking Areas	◔	●	◔	◔	○
	New Vehicles or Equipment	◑	●	○	○	◑
	Maintenance	◔	◔	◔	◔	◑

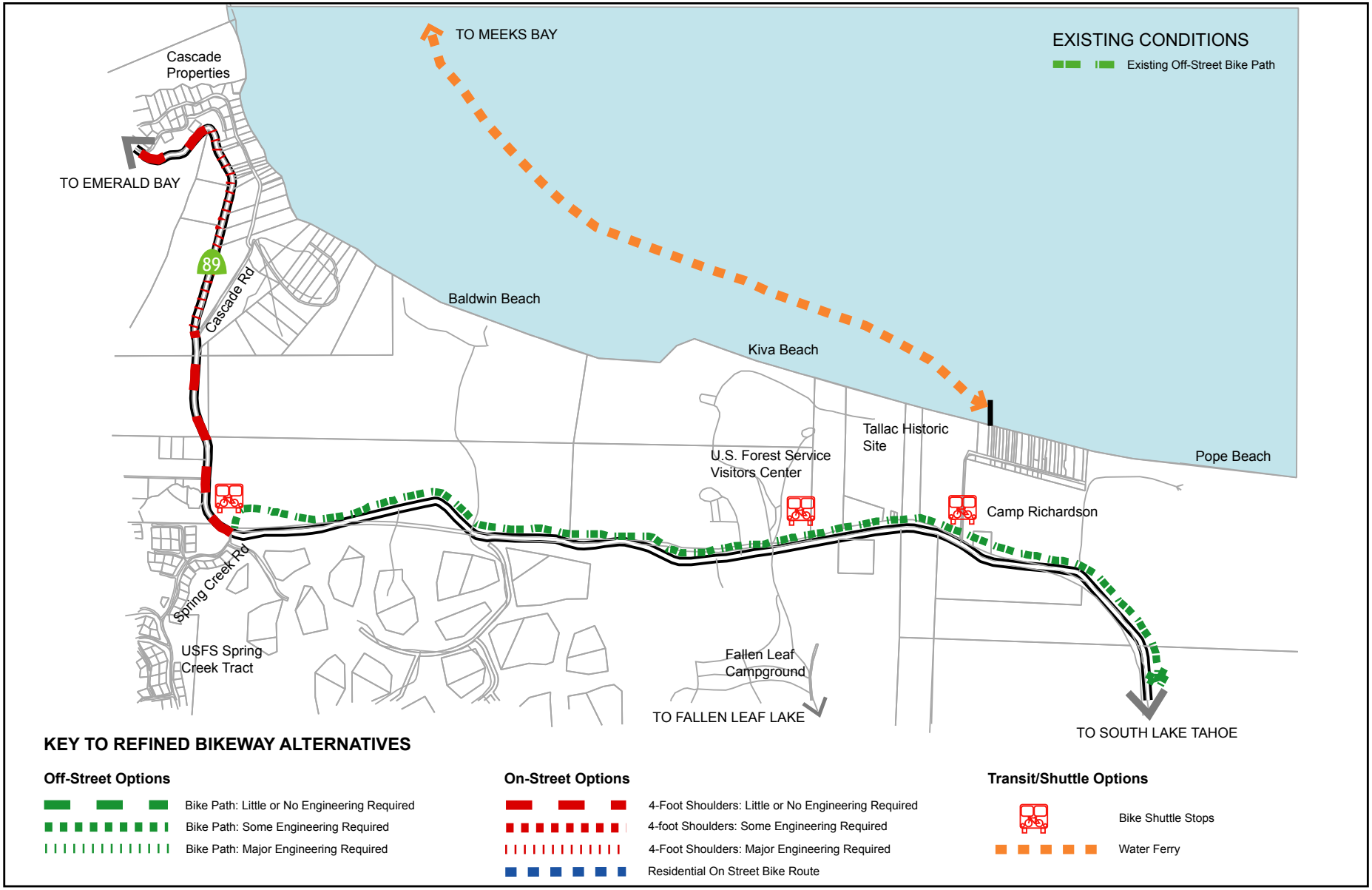


Figure 3-13
Refined Bikeway Alternatives: Segment 1

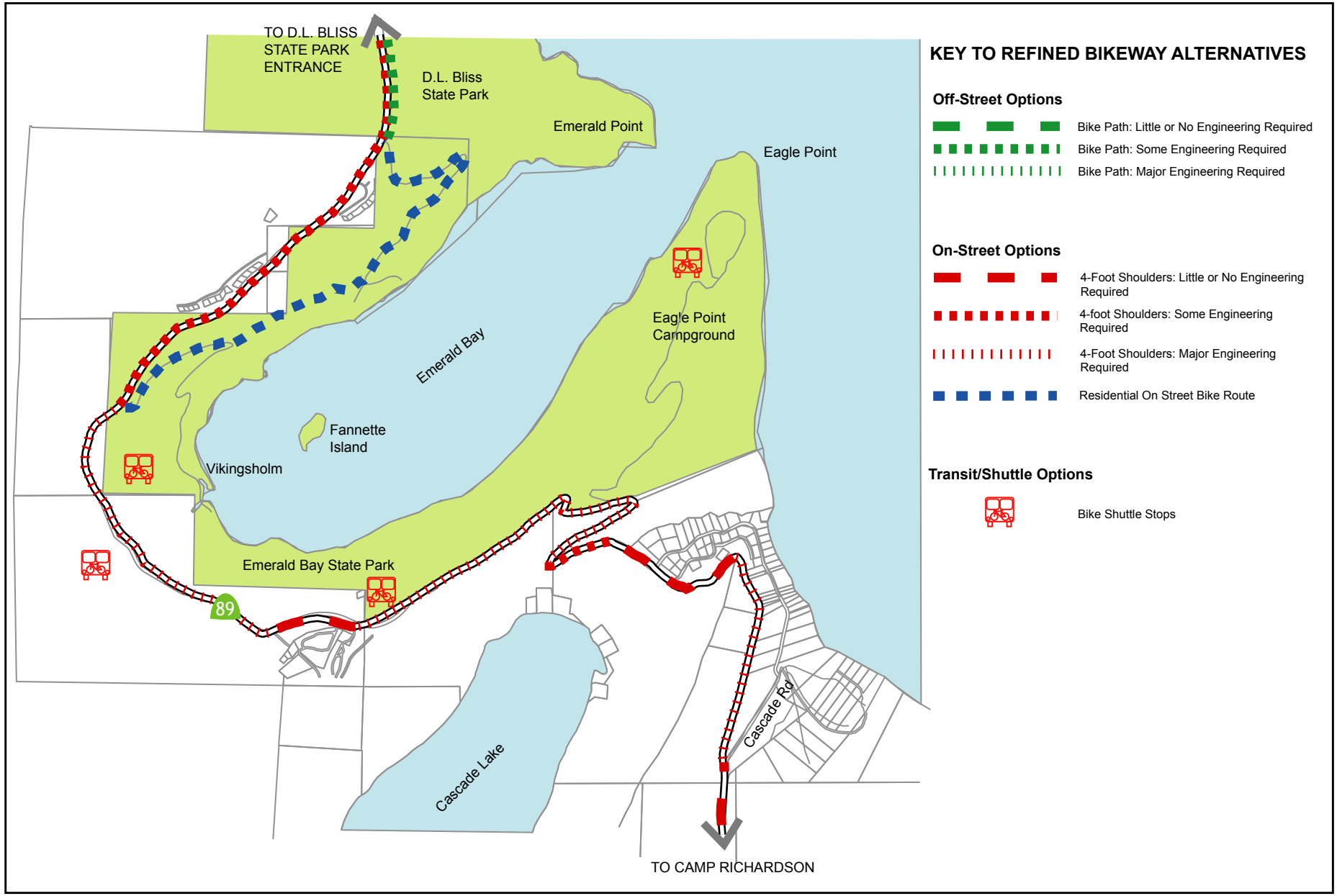


Figure 3-14
Refined Bikeway Alternatives: Segment 2

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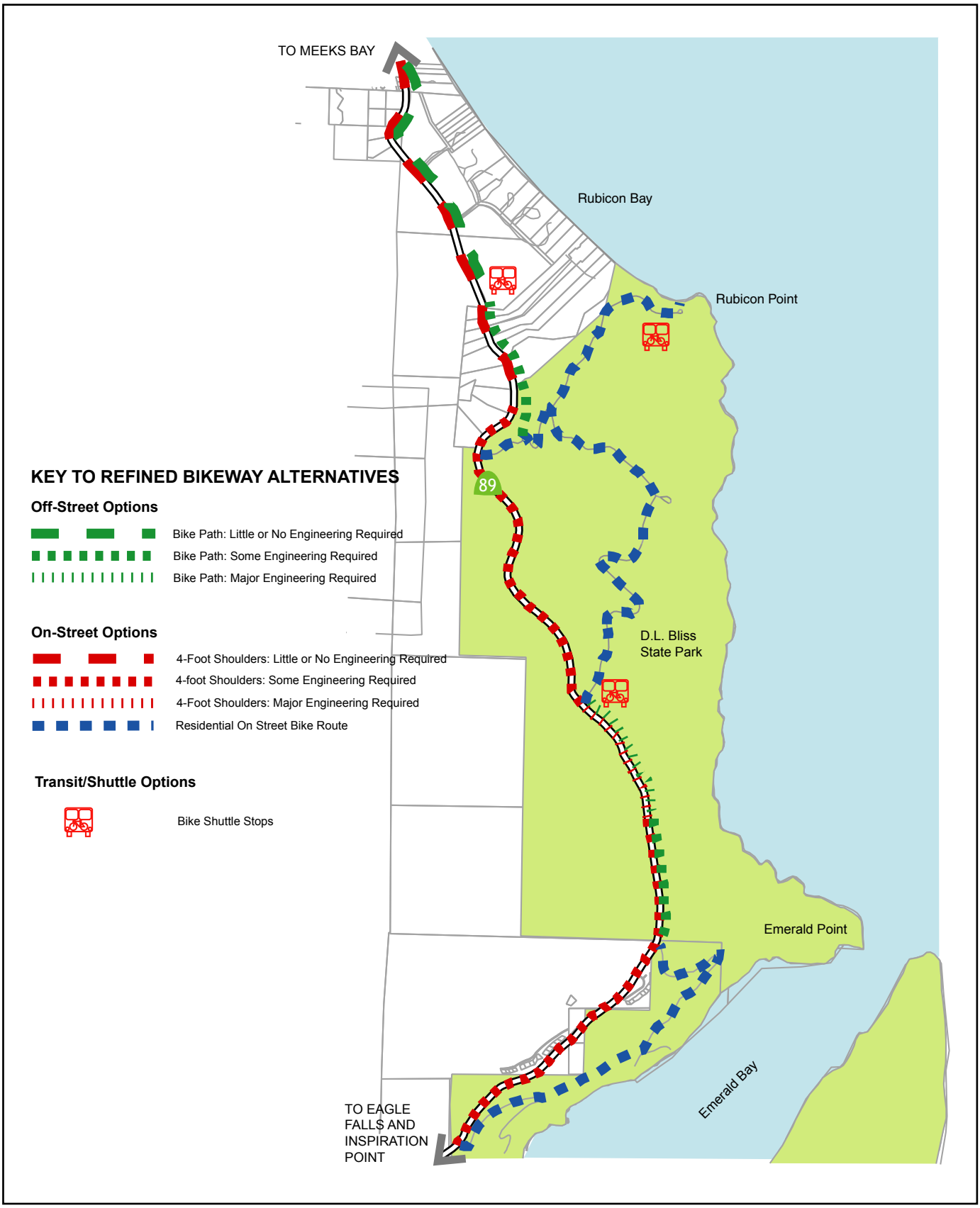

Figure 3-15
Refined Bikeway Alternatives: Segment 3

alta PLANNING + DESIGN

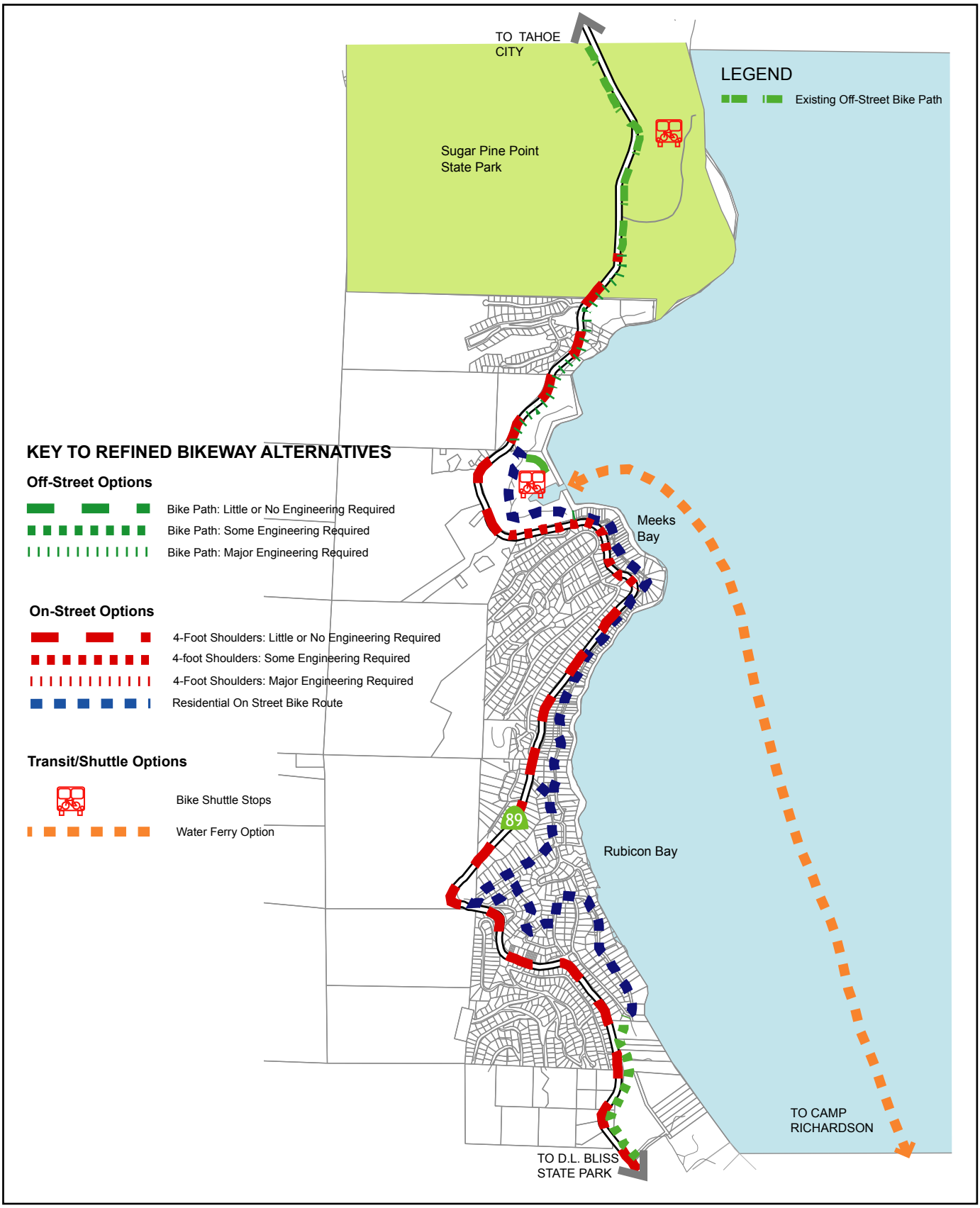

Figure 3-16
Refined Bikeway Alternatives: Segment 4

Emerald Bay there are areas where an off-street bikeway could be constructed adjacent to the highway right-of-way with fewer environmental and engineering impacts than a shoreline alignment. These include the segment between the top (north) end of the viaduct and the D.L. Bliss State Park entrance, the segment through the Paradise Flat area, and the segment north of Meeks Bay. As part of the alternatives refinement process, these segments were classified into areas where 1) Little or no engineering would be required in order to provide four-foot shoulders; 2) Some engineering would be required; or 3) major engineering would be required. These classifications are shown on the Refined Alternatives maps.

ALTERNATIVE 2: ON-STREET BIKEWAY

Based on the assumption that 4 feet was the desired shoulder width throughout the corridor, and using the SR-89 cross-sections, the entire study corridor was classified into areas where 1) Little or no engineering would be required in order to provide four-foot shoulders; 2) Some engineering would be required; or 3) major engineering would be required. These classifications are shown on the refined alternatives maps. It should be noted that these are general classifications based on typical segment characteristics, intended to show the general location of constrained segments along the corridor. There may be areas within a certain classification that are more or less constrained than indicated. A detailed survey of the entire corridor (as is being conducted as part of the water quality improvement project) will need to be conducted prior to any shoulder improvements.

Based upon a preliminary field review of existing roadway widths, and topographic conditions immediately adjacent to the roadway, it appears that the development of four foot shoulders along SR-89 is possible throughout much of the corridor, with the exception of the switchback areas leading up from Cascade Creek, the razorback ridge, and the segment around Emerald Bay from Inspiration Point to the top of the viaduct. Within these constrained areas, some limited shoulder widening may be possible to increase the width available to cyclists. In some places, it may not be possible to widen the shouders at all. Final plans for shoulder widening within the SR-89 study area will be determined by Caltrans as part of their water quality improvement project for the corridor.

ALTERNATIVE 3: TRANSIT/SHUTTLE BUS

A dedicated bike shuttle service would effectively "compete" with the existing summer transit services along the same corridor. A better option would be to work with the North and South Shore transit agencies to ensure that their existing services can carry bicycles and that their services provide convenient connections. The availability of this effective shuttle service could then be included in regional bicycling information guides, which could both help to improve overall bicycling conditions as well as ridership on these existing services.

ALTERNATIVE 4: WATER FERRY

A bicycle ferry could provide a means for cyclists to avoid the most challenging terrain of the corridor, and could serve as a unique recreational experience in itself. Major issues related to a bicycle ferry operation include obtaining permits for docking locations, and start-up and operational costs. As with other aspects of public transportation services, it is reasonably easy to obtain capital funding for new projects, but very difficult to generate new operating funding. There are several

state and federal transportation funding sources that could potentially be tapped to provide financial support of this service, such as the state's Transportation Development Act funds or the Federal Transit Administration's Section 5311 rural public transportation funds. However, all funds generated by these programs currently available to the Tahoe Region are effectively already being used to fund existing transit programs, such as the transit programs in Placer County and South Lake Tahoe. There appears to be no existing mechanism by which Caltrans highway or bicycle facility funds could be used to fund the ongoing operating costs of a ferry service. As is the case for many other local transportation programs, funding these ongoing operating costs would likely be the biggest obstacle to overcome in implementing this alternative.

ALTERNATIVE 5: SCHEDULED ROAD CLOSURE

The scheduled closure of SR-89 through Emerald Bay would undoubtedly create a very attractive amenity for bicyclists and other non-motorized users. However, it would result in significant traffic and parking problems, as discussed above, particularly in the two to three hour period at the end of the closure period. As noted earlier, the details of a scheduled closure would require review and discussion among a wide range of groups and agencies, including Caltrans, the local Sheriff and Fire Departments, State Parks, USFS, and local landowners, and ultimate approval of a scheduled road closure would need to be granted by Caltrans. At this time, Caltrans has indicated that they do not support scheduled closure of SR-89 as discussed in this alternative.

CONCEPTUAL ALTERNATIVES CONSIDERED BUT REJECTED

As part of the Technical Advisory Committee process, a number of preliminary conceptual alternatives were suggested and discussed, but ultimately rejected for detailed evaluation as part of this study. Reasons for rejecting preliminary conceptual alternatives included: not meeting the overall goals of the project; not functional for cyclists; clear significant environmental impacts, or lack of support from a majority of TAC stakeholders.

Preliminary conceptual alternatives considered but rejected include:

Class II Bike Lanes. As discussed under Alternative 2 above, bike lanes on SR-89 were rejected in favor of widened shoulders.

Colored Asphalt Shoulder Areas. Colored asphalt treatment was suggested as a means of better delineating the bicycle/shoulder area from the travel lane. This alternative was rejected for similar reasons to the bike lane issues discussed under Alternative 2.

Elimination of parking at Vikingsholm and mandatory shuttle access into Emerald Bay State Park. This alternative would involve a substantial change in the way the Emerald Bay recreational areas are accessed by short-term visitors. While many on the TAC agreed that such access changes to limit vehicular traffic into the Emerald Bay area would have positive impacts related to bicycle access (and overall environmental quality) and may be desirable in the future, such a change would require a major policy shift by State Parks and new facility development, including a new shuttle system, development of staging/parking areas outside of Emerald Bay, and provisions to ensure that

through-traffic on SR-89 is not disrupted. It was decided by the TAC that this would be a longer-term change that would need to be led in large part by California State Parks as part of a revision to their Emerald Bay State Park master planning document.

Unpaved Bike Trails. While unpaved bike trails through the area were suggested as a means of reducing impervious surface coverage, the Lahontan RWQCB noted that unpaved trails are still considered to be increased coverage, and it was concluded that unpaved trails would not provide an appropriate surface for road cyclists.

Ferry between Emerald Point and Eagle Point. A ferry connector across the mouth of Emerald Bay was suggested as one means of providing a link between the Cascade Creek Section and DL Bliss State Park, bypassing the most crowded sections of Emerald Bay State Park. Because this option would require a Class I bike path extending to both Emerald Point and Eagle Point, which was determined to be undesirable for environmental and engineering reasons, this conceptual alternative was dropped form consideration.

4. PREFERRED BIKEWAY CONCEPTS

Based on the environmental, transportation and engineering analysis in chapter 3, input from the Technical Advisory Committee, and the further refined conceptual alternatives, the final step in the bikeway study process was to develop a Preferred Bikeway Concept. Due to the challenges of the SR-89 corridor in terms of roadway width, topography and environmental and engineering issues, and the desire of this study to identify a bikeway that appeals to a wide range of potential users, a single Preferred Concept was not selected. Instead, several preferred bikeway concept options were identified as being desirable for development along the corridor. These preferred concepts are based on the conceptual and refined alternatives identified in Chapter 3, and specifically include the following options:

- Off-Highway Bikeway: Identifies a route that includes a combination of off-street bike paths and on-street bike routes to take riders from Meeks Bay south to Emerald Bay State Park without requiring travel on SR-89.
- On-Highway Bikeway: Identifies possible locations for widening shoulders between Spring Creek Road and Meeks Bay in order to improve safety for cyclists who choose to ride on the highway. Includes potential for "differential" shoulder widening; where right of way is restricted widen shoulders only on uphill side of road.
- Transit/Shuttle Bus: Identifies options for an improved transit system that would allow cyclists to bypass the challenging terrain of study corridor, or when combined with the bikeway options above, to combine a cycling trip with a transit trip.
- Water Ferry: Identifies options for both transit and recreational-oriented water transit as it relates to the study corridor.

Figures 4-1, 4-2, 4-3, and 4-4 on the following pages illustrate the Preferred Bikeway Concepts. The remainder of this chapter discusses each of these Preferred Bikeway Concepts in detail.

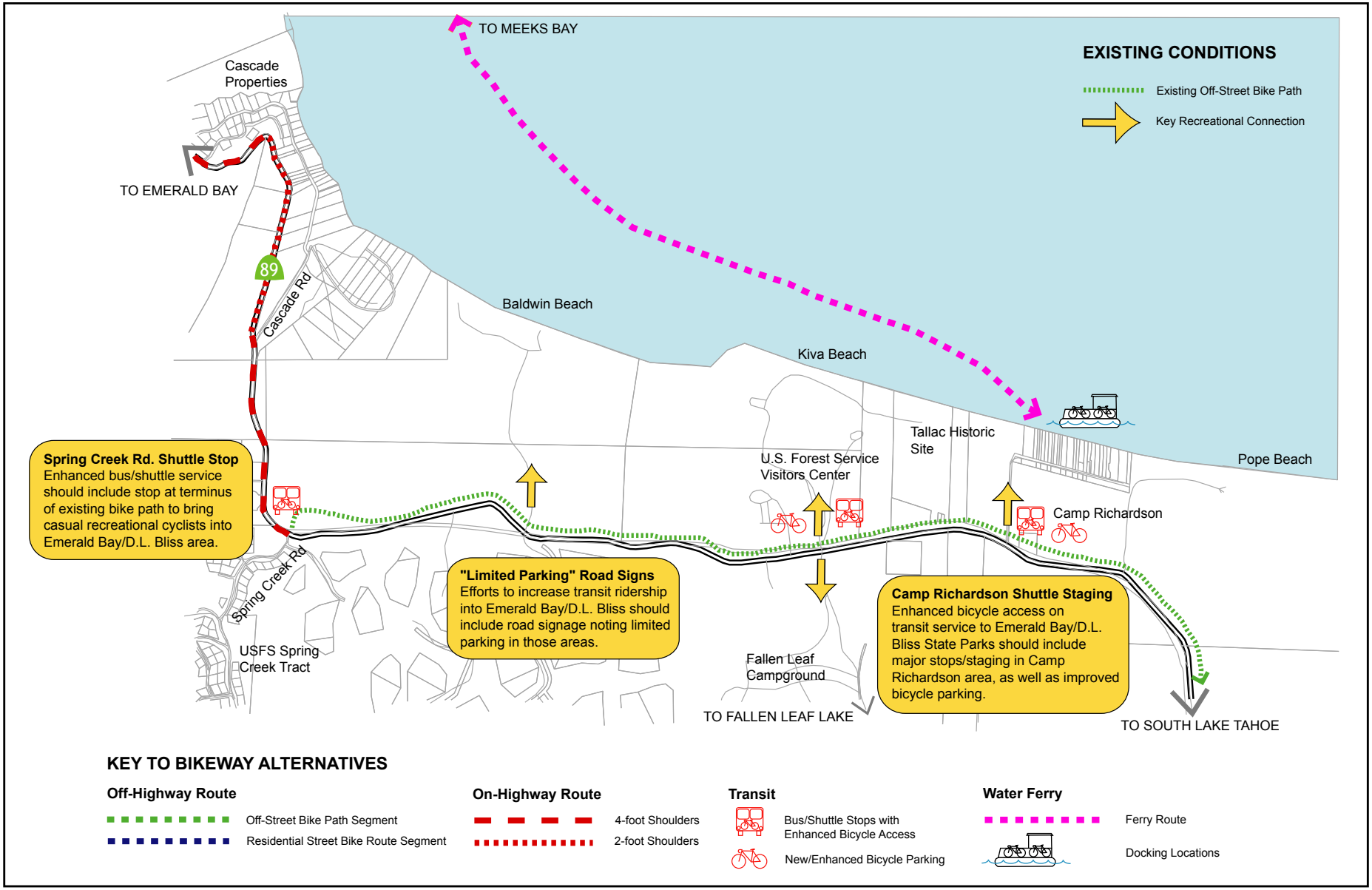

Figure 4-1
Preferred Bikeway Concepts: Segment 1

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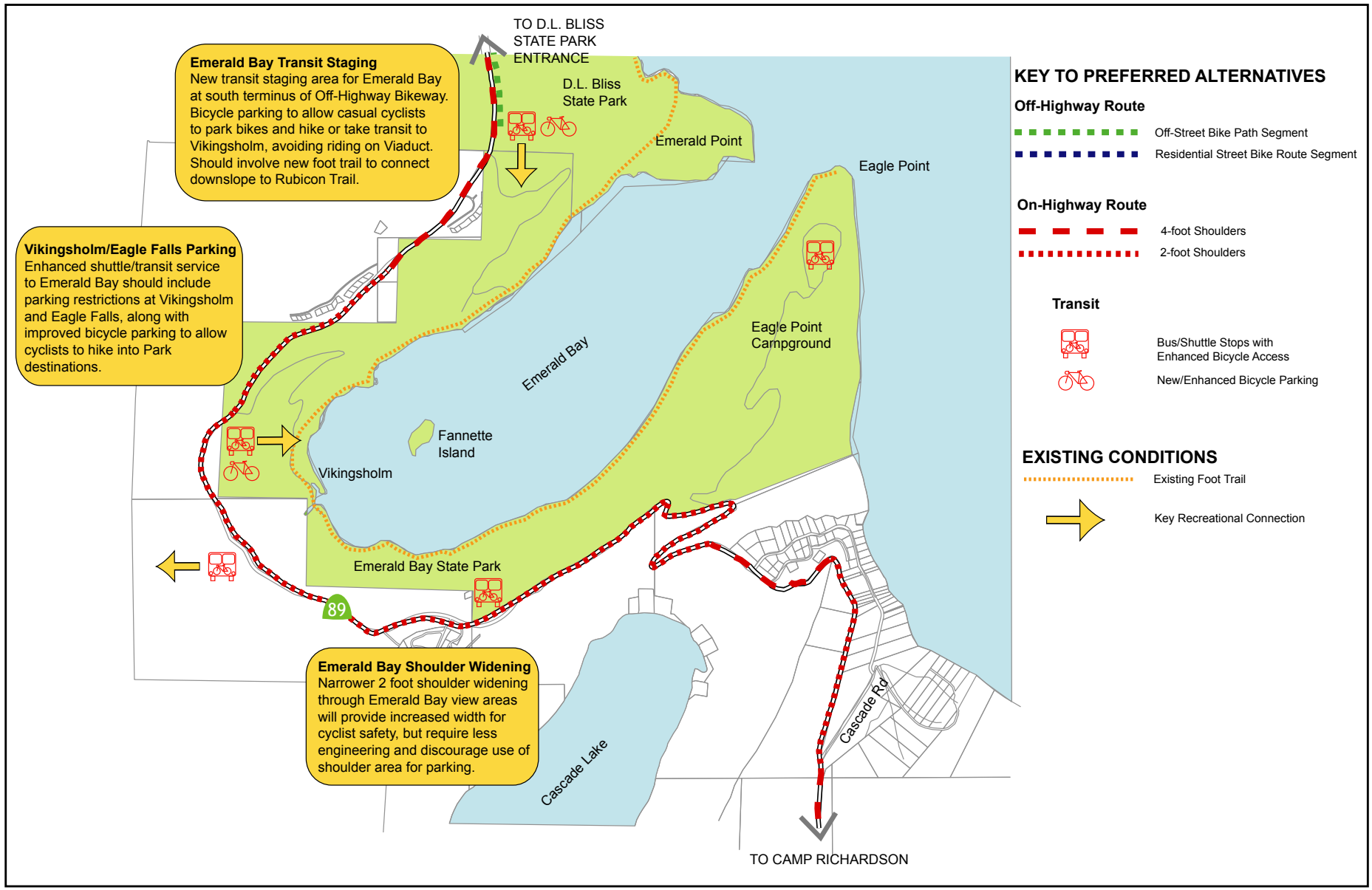

Figure 4-2
Preferred Bikeway Concepts: Segment 2

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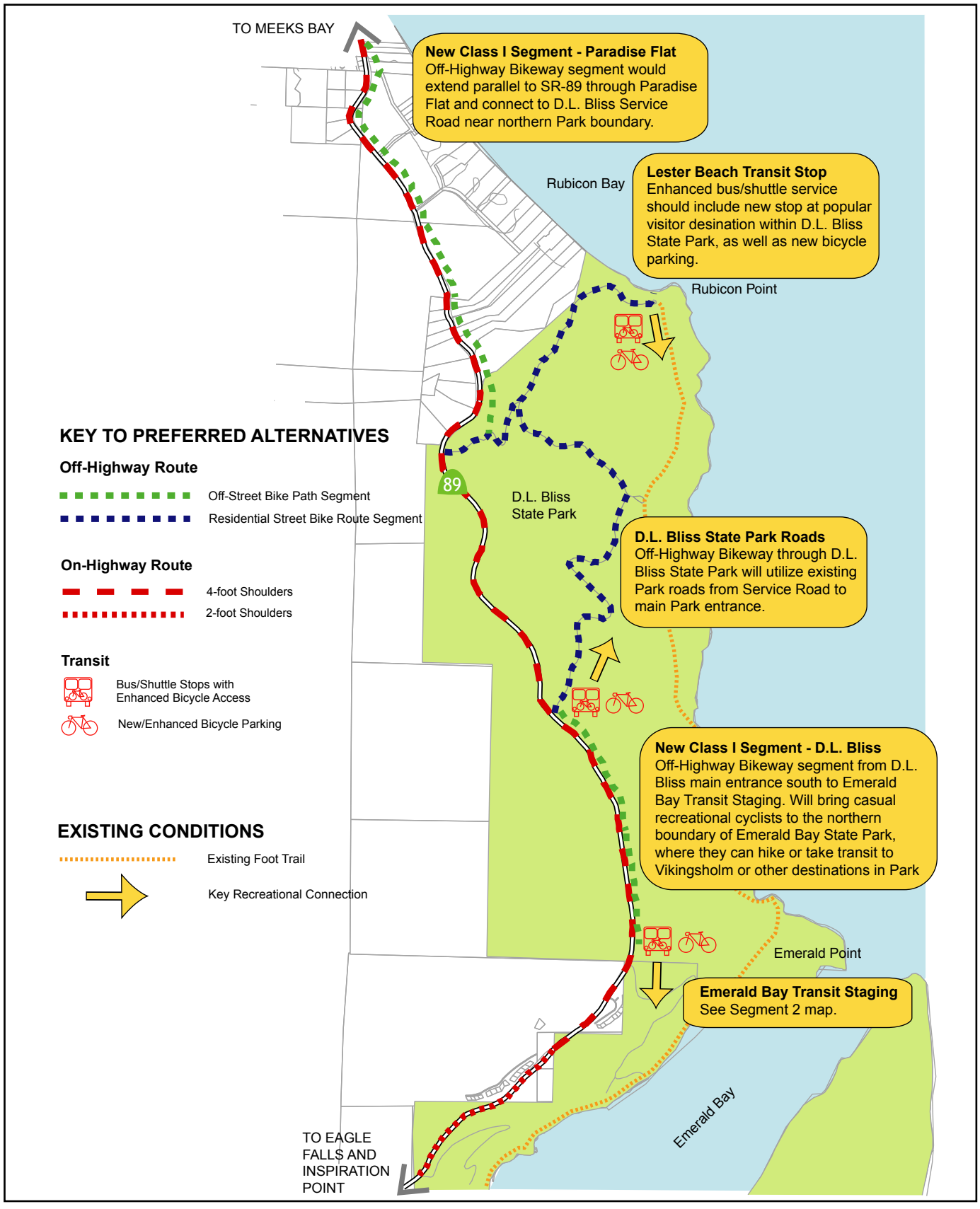

Figure 4-3
Preferred Bikeway Concepts: Segment 3

alta PLANNING + DESIGN

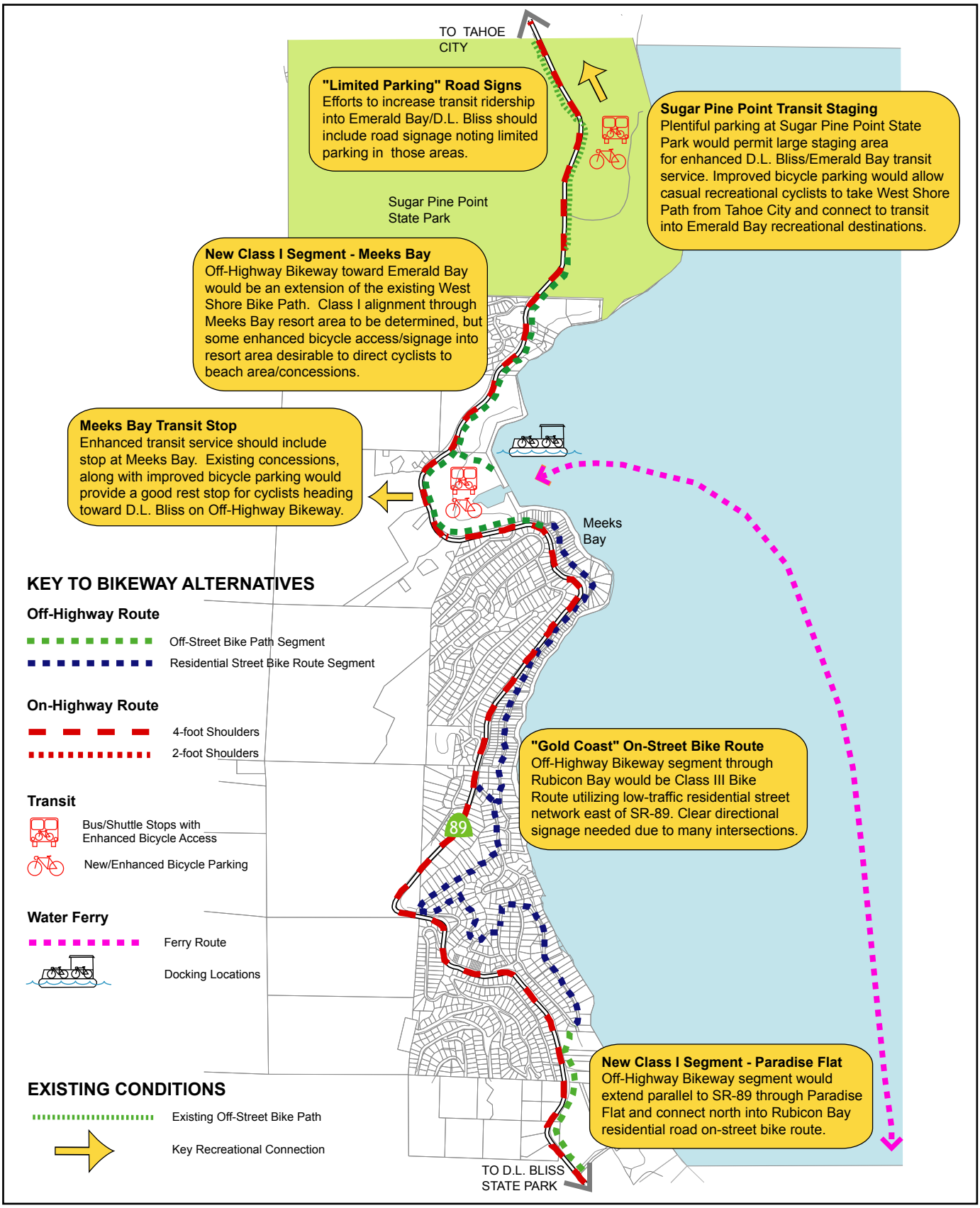

Figure 4-4
Preferred Bikeway Concepts: Segment 4

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OFF-HIGHWAY BIKEWAY

This section describes the preferred Off-Highway Bikeway alignment. Based on the analysis in chapter 3, it was determined that developing an off-street bike path (Class I) along the entire corridor would not be desirable, primarily due to significant environmental and visual impacts, as well as engineering requirements and private property impacts. It was also determined that developing wide (four foot) shoulders would not be possible for the entire length of SR-89. However, there were some areas where a Class I bike path would be possible to build with minimal impacts, and there were also areas where a Class III bike route would be possible on low-traffic residential streets. Given this information, an "Off-Highway" bikeway route was proposed, one that would involve a continuous route of off-street paths (Class I) and on-street bike routes (Class III) that would allow a cyclist to avoid riding on SR-89 entirely. This route would be oriented toward the casual cyclist, focusing on providing access to major visitor destinations and maintaining an alignment with as little topographic change as possible. Based on the engineering and environmental analyses, and discussions with the Technical Advisory Committee, it was generally determined that developing an off-highway bike trail through the entire Study corridor was not possible, but that such a bikeway could feasibly be developed north of Emerald Bay State Park, starting at approximately the top of the viaduct. This section describes the Off-Highway route in detail.

SEGMENTS 1 AND 2: SPRING CREEK ROAD TO D.L. BLISS STATE PARK BOUNDARY

Based on the engineering and environmental analysis, construction of an off-street bike path from Spring Creek Road north around Emerald Bay is not considered desirable due to the environmental and visual impacts, private property impacts, and major engineering required. This is not to say such a path would not be possible to engineer and construct. However, in order to make the path attractive to family cyclists, the path would need to stay near the shoreline to avoid the significant elevation change between Spring Creek Road and Inspiration Point. This shoreline alignment would result in substantial impacts as discussed in Chapter 3.

Throughout this area there are very few options for Class III bike routes on residential roads adjacent to the highway. One roadway that was evaluated was the loop road within the Cascade Properties neighborhood. It was determined that due to the current unpaved condition of the road, the fact that the roadway is under private ownership, and the severe uphill grade toward Cascade Creek, the Cascade Properties road would not be a desirable off-highway route for the casual cyclist. Heading up from Cascade Creek toward Inspiration Point, and then down toward Vikingsholm, there are no alternative roads to SR-89 that could be used as part of the Off-Highway option.

Given this information, it was concluded that the Off-Highway Bikeway would not be possible between Spring Creek Road and Vikingsholm, effectively limiting bicycle access through these areas to SR-89 only (see the section for the On-Highway Bikeway below for a discussion of recommended on-road improvements).

However, as discussed in the following section, it was concluded that the Off-Highway Bikeway route could be possible for much of the corridor north of Emerald Bay State Park. The discussion then turned to the appropriate location for the southern terminus of this Off Highway Bikeway: would it be the Vikingsholm parking lot, or should a new location be recommended past the

Viaduct near the Emerald Bay service road? While the Vikingsholm parking lot is an existing developed facility that would be a logical stopping point for cyclists, the Viaduct segment involves a steep grade and a narrow roadway width, and cyclists that make it downhill to Vikingsholm may have difficulty getting back up the hill on the return trip.

From the Vikingsholm parking lot SR-89 climbs north at a grade of approximately 7% to 8% for approximately 4,000 feet to the gate used to close the highway during severe winter storms, periods of high avalanche potential, and snow removal operations. This section of SR-89 is the Emerald Bay viaduct. The only off-street trail option from an engineering standpoint would be to construct a second viaduct for the bike trail below the highway viaduct. The grade of this bike trail would be the same as the highway or approximately 7% to 8%. This is very steep and could pose problems for casual cyclists or bikes with inadequate brakes traveling in the downhill direction. In the uphill direction this grade may be a problem for casual cyclists. There would also be visual impacts associated with the second viaduct. In light of these issues, constructing a new off-street path parallel to the Viaduct was not considered possible.

As an alternative to an off-street path along the Viaduct, completing the off-highway connection to Vikingsholm could be provided via the Emerald Bay access road from SR-89, with the cooperation of State Parks. This option would bring cyclists down to the Vikingsholm. This roadway has an extremely steep grade, which could result in unsafe speeds by downhill cyclists and could prove difficult for uphill cyclists attempting to get back to the highway from Vikingsholm. For this reason, and given existing State Parks policy prohibiting bicycle access into Emerald Bay State Park, allowing bicyclists to use the access road is not recommended at this time. However at a minimum, terminating the off-highway bikeway at the Emerald Bay access road would provide visitors a place to lock their bikes and then hike down the road into Emerald Bay State Park and Vikingsholm.

For the above reasons, it was concluded that the southern terminus of the Off-Highway Route should be in a new location near the Emerald Bay service road. This location would involve new trailheads, a transit stop (discussed below under the Transit concept), and bike locking facilities, so that cyclists could park their bikes and either hike to Vikingsholm or catch a shuttle down the hill to the Vikingsholm parking lot. Cyclists wishing to reach the Vikingsholm parking lot on their bikes could do so via SR-89. Unless Emerald Bay State Park bike access prohibitions are revised, bicycling down to Vikingsholm via the service road would not be permitted as part of this option.

SEGMENT 3: D.L. BLISS STATE PARK BOUNDARY TO PARADISE FLAT

As noted above, a shuttle stop or trailhead located near the Emerald Bay access road would be preferred compared to the Vikingsholm parking lot location. This location would serve as the southern terminus of the Off-Highway bikeway.

Emerald Bay Service Road to D.L. Bliss Entrance

North of the Emerald Bay Service Road, SR-89 drops down at approximately a 3% grade for 1,400 feet to a low point. The grade of an off-street bike path parallel to the highway would not pose any problems for casual cyclists. The bike path alignment would be approximately 50 to 100 feet east of the highway. This area is heavily forested. This portion of bike path could follow the existing grade with a moderate amount of grading. The cross slope of the ground in this area is approximately 10%

to 15%. There would be a moderate amount of tree removal required for this portion of trail. This would result is some visual impact as viewed from the highway. This portion of trail would not be visible from Lake Tahoe.

From the low point described above the highway climbs at approximately 6% to 7% for approximately 700 feet to a high point. This high point is approximately 2,100 feet north of the southwest corner of section 16. The grade of the trail could pose problems for casual cyclists. The cross slope of the ground next to the highway in this area is a very steep fill slope transitioning to a steep cut slope. In the highway fill slope area either a retaining wall or raised bridge type structure would be required for the trail to follow the highway. In the highway cut slope area a retaining wall would be required for the trail to follow the highway. This portion of trail would be visible from the highway and may be visible from Lake Tahoe. It may be possible to design a trail farther from the highway and avoid the need for retaining walls or bridge type structures. However, the terrain in this area is fairly rugged and would require detailed topographic surveys and detailed engineering design that is beyond the scope of this report.

From the high point described above to the main entrance to D.L. Bliss State Park the highway goes up and down at moderate grades. These grades should not pose any problems for casual cyclists. The cross slopes of the ground next to the highway in this area are very steep cut and fill slopes. In the highway fill slope areas either a retaining wall or raised bridge type structure would be required for the trail to follow the highway. In the highway cut slope areas a retaining wall would be required for the trail to follow the highway. This portion of trail would be visible from the highway and may be visible from Lake Tahoe. It may be possible to design a trail farther from the highway and avoid the need for retaining walls. However, the terrain in this area is fairly rugged and would require detailed topographic surveys and detailed engineering design that is beyond the scope of this report.

Disturbance to Stream Environment Zones (SEZs) or jurisdictional wetland areas for off-highway bikeway development would require permitting/consultation with RWQCB and the US Army Corps of Engineers.

D.L. Bliss Entrance to Paradise Flat

At the D.L. Bliss State Park entrance, the Off-Highway Route would utilize the internal park entrance road (Lester Beach Road). This road would provide access to Lester Beach, and to the campground areas within the State Park. Signage warning motorists of the potential presence of bicyclists on the roadway should be installed, along with signage instructing cyclists to slow their speeds on downhill segments. The route would turn west (left) at the northern D.L. Bliss service road and head back toward SR-89. Near the intersection of SR-89 and the D.L. Bliss service road, an off-street bike path would again pick up. Specifically, this segment of bike path would start at the D.L. Bliss service road where the Balancing Rock Nature Trail intersects the service road. This is approximately 300 feet northeast of where the service road crosses Rubicon Creek. From this point on the service road, a bike path could follow the 6,360 contour on the 7.5 minute USGS quadrangle in a northerly direction for approximately 500 feet until it intersects Highway 89. A significant portion of the ground on this alignment has been previously disturbed. This portion of bike trail could easily follow the existing grade with minimal grading. The cross slope of the existing ground is nearly flat. The grade of the trail would not pose any problems for casual cyclists. There would be very little vegetation disturbance required and probably no tree removal. This portion of trail would

not be visible from Lake Tahoe. The additional coverage resulting from this trail segment would require approval from RWQCB.

Through the Paradise Flat area, a bike path could be developed parallel to SR-89 with minimal engineering, given the flat topography. Some tree removal may be necessary, and the trail would have the potential to disturb the riparian and stream environments associated with drainages found in this area; special trail design and drainage crossing techniques would be utilized to minimize environmental impacts. Disturbance to Stream Environment Zones (SEZs) or jurisdictional wetland areas for off-highway bikeway development would require permitting/consultation with RWQCB and the US Army Corps of Engineers.

Although the Paradise Flat area is primarily under private ownership, it is expected that much of the bike path alignment through this area could be developed immediately adjacent to the highway within the Caltrans right-of-way.

SEGMENT 4: PARADISE FLAT TO MEEKS BAY

Heading north from Paradise Flat area into the Rubicon Bay residential area, the SR-89 alignment begins to climb. At this point, the bike path would leave the highway right-of-way and connect into the Rubicon Bay neighborhood street network. Specifically, this section of bike path would extend from Highway 89 down to the intersection of Rubicon Drive and South Lane. This section of trail would be approximately 1,500 long. An easement through private property would be required in order to make this connection.

The highway is approximately 50 feet higher in elevation than the intersection of Rubicon Drive and South Lane. The grade of the trail would be approximately 3%. This grade should not pose any problems for casual cyclists. This section of trail would traverse a slope with a cross slope of approximately 25%. The slope has a thick cover of manzanita that is approximately five feet tall. There are also scattered fir trees on the slope. It is likely that the trail could be aligned to avoid the need to remove more than a few of these trees. This section of trail would be visible from Lake Tahoe. The cut and fill slopes and manzanita removal would increase the visibility of the trail.

Through the Rubicon Bay neighborhood, the Off-Highway Bikeway would exist as a Class III on-street bike route. The bikeway could stay on neighborhood streets the entire way to the Meeks Bay campground. Through this area, directional signage would be necessary, as the street network curves and intersects several other roadways. In the area between Victoria Circle and Rubicon Drive, acquisition of an easement onto existing private roads should be explored in order to provide a more direct bikeway alignment through this gap.

The north terminus of the on-street portion would be Meeks Avenue, which dead-ends just south of the Meeks Bay Campground. At the end of Meeks Avenue there is a chain link fence with an opening that allows pedestrian access. At the terminus, a bike path could continue in a westerly direction to the Meeks Bay Campground. There are barrier posts on both sides of the opening that would preclude horses and motorcycles from passing through the opening. Bicycles could pass with some difficulty. There is an existing footpath leading down from this opening to the eastern limits of the Meeks Bay Campground.

From the opening in the fence the trail drops approximately 20 feet to 30 feet in elevation in a horizontal distance of approximately 200 feet. This is a longitudinal grade of 10% to 15%. The bike path in this area would most likely follow this alignment. The 10% to 15% grade would pose a problem for casual cyclists. However, the overall distance and grade change is relatively small. In the uphill direction casual cyclists could dismount and walk this short distance if necessary. In the downhill direction the trail could be flat and in a straight alignment to allow cyclist with inadequate brakes to recover. Alternatively, cyclists with inadequate brakes could dismount and walk this short section. The cross slope of the ground in this area is approximately 20% to 25%. There would be a moderate amount of tree removal required for this portion of trail. This portion of trail would be visible from Lake Tahoe. This would result in some visual impact as viewed from Lake Tahoe. From the bottom of this steep section the trail could go through the Meeks Bay Campground at nearly flat grades with minimal grading and no tree removal.

The Meeks Bay Resort and Marina is currently operated by the Washoe Tribe under a lease from the US Forest Service. The Washoe Tribe has indicated that they would prefer that any bikeway alignment through this area be constructed parallel to SR-89, preferably within the highway right-of-way, rather than extending through the Marina area. Specific alignment of a bikeway through Meeks Bay would need to be taken into account during the detailed trail planning process. In general, though, a designated bicycle connection into the Meeks Bay Marina area would be highly desirable, as this area is a popular visitor destination on the West Shore. Meeks Bay would be a likely end point of bicycle trips south from Tahoe City, or for cyclists continuing south toward Emerald Bay, Meeks Bay would be a logical place to stop, rest, get water or a snack at the concession stand. If the bikeway were constructed through the Resort and Marina area, directional signage would be necessary.

The northern limit of this bikeway study is Meeks Bay; however, full success of the Off-Highway Bikeway would require that the existing West Shore bikeway be extended south from its current terminus to Meeks Bay, as planned by the TCPUD.

ON-HIGHWAY BIKEWAY

For the On-Highway Bikeway option, SR-89 was evaluated for its ability to accommodate on-street bicycle facilities. In this case, 4-foot shoulders were assumed to be the desirable treatment. It was concluded that striped and stenciled bike lanes were not appropriate for the corridor for several reasons discussed in chapter 3. For cyclists along SR-89, the key feature would be to ensure the maximum distance between the edge line (fog line) and the roadway edge, which could be accomplished simply through wider shoulders. The more shoulder width available, the better separation between the cyclist and motorists.

In terms of the On-Street Bikeway, the recommended preferred concept would be to develop a four-foot shoulder width along the study corridor where possible, with the exception of the Emerald Bay area. Based on the field review of highway width and topographic conditions, it is clear that installing a four-foot shoulder will not be possible along all segments of the SR-89 alignment. In some cases, particularly the switchbacks and moraine ridge, it may be difficult to get any additional shoulder without significant engineering or cut fill. Around Emerald Bay, a reduced shoulder width is recommended regardless of available highway width, due to parking problems within this area.

In cases where it is not possible to widen the shoulder on both sides of the road, "differential" shoulder striping should be considered. This means that the possibility of widening the shoulder on the uphill side should be considered, as that is the side of the road where a slow-moving bicyclist is most likely to affect traffic flows. The provision of an extra one or two feet of shoulder on the uphill side on a narrow segment of roadway could allow enough extra room for vehicles to safely pass a cyclist without crossing the centerline.

As noted in Chapter 3, Caltrans is currently conducted a Project Study Report for SR-89 between the Placer County line and the Alpine County line to conduct water quality improvements. These improvements will include the provision of 4-foot shoulders along SR-89 where possible; this project is expected to be completed by 2010. While not intended as a bikeway project, many of the recommendations for shoulder widening identified in this Bikeway Study will occur as part of this water quality improvement project. This document makes general recommendations about the likelihood of achieving four-foot shoulders throughout the study area, and also notes where exceptions to a four-foot shoulder width are desirable from a cyclist safety standpoint. It should be noted, however, that a detailed engineering analysis of future locations of shoulder widening along SR-89 was outside the scope of this Bikeway Study, and will be completed as part of the design and engineering work for the SR-89 water quality project.

For all areas of the SR-89 alignment, shoulder widening that will impact wetland or SEZ areas will require consultation/permitting from RWQCB. In some SEZ or wetland areas, differential shoulder striping may be a possible alternative to four-foot shoulders on both sides. In other SEZ or wetland areas, reduced shoulders (e.g. two foot) on both sides may be a better alternative.

In areas where shoulder widening would parallel the proposed off-highway Class I bikeway, close coordination with RWQCB will be required to ensure that such parallel facilities will not result in significant SEZ or wetland disturbance. It is important to note that although proposed on- and off-highway bikeway facilities would be parallel, they are not duplicative in that they serve very different user groups. Wide shoulders would serve more experienced road cyclists, where the Class I off-highway facility would serve more casual or family cyclists. In areas where the presence of wetland or SEZ areas would prevent the development of parallel wide shoulders and Class I facilities, it is recommended that the Class I facility be maintained and the shoulder widths narrowed to reduce wetland/SEZ impacts.

SEGMENT 1: SPRING CREEK ROAD TO CASCADE CREEK

From Spring Creek Road north to Cascade Road, shoulder widening appears possible on both sides with minimal engineering.

From Cascade Road north, the roadway narrows and climbs along the side of the slope. Given the retaining walls on the upslope side and steep drop off downslope, achieving a four foot shoulder on both sides of the roadway may not be possible without major engineering. SR-89 flattens out and widens out as it approaches Cascade Creek; this area appears possible for 4 foot shoulders.

SEGMENT 2: CASCADE CREEK TO EMERALD BAY STATE PARK

From Cascade Creek to Inspiration Point, SR-89 is characterized by steep uphill grades, exposed slopes, switchbacks, and a section of roadway along the "razorback" ridge of the moraine. For most of this segment, development of four-foot shoulders will require substantial engineering and cut/fill. Along the moraine, where the roadway consists of two 10 foot lanes, additional shoulder can come only with cantilevering off the side, fill/retaining walls, or by lowering the entire roadbed by grading along the top of the ridge. All of these solutions would be extremely costly, and could have substantial environmental impacts. While shoulder widening through this area is highly desirable, ultimate determination of whether it is possible given the costs, engineering, and environmental impacts will be made by Caltrans as part of the SR-89 shoulder widening project.

In the immediate vicinity of the Inspiration Point parking area, the topography flattens out and widening SR-89 appears possible with minor engineering.

From Inspiration Point to Vikingsholm, there appears to be intermittent room for shoulder widening. However, throughout this area the potential for vehicle parking in the shoulder (for the views of Emerald Bay) becomes a primary concern. Widening the shoulder to four feet to accommodate bicyclists may have the undesirable effect of providing more informal parking spaces along the highway, and actually worsening cycling conditions by having the shoulder completely blocked by parked vehicles and increasing the number of cars pulling on and off the highway. Through discussions with the TAC, four foot shoulders were determined to be too wide for this segment, in that they would allow a car to pull almost completely off the roadway into the shoulder; requiring bicyclists to swerve out into the travel lane to get around the parked cars. Although "No Parking" signs and enforcement could help reduce the incidence of this problem, many violators would be one-time visitors to the area and issuing a ticket would not have the desired effect of discouraging future behavior. The TAC concluded that the shoulder widening design for the Emerald Bay area would need to be designed to provide additional room for cyclists, but not allow enough room for vehicles to park. It was concluded that two foot shoulders would be an appropriate desired width for the Emerald Bay area (although acknowledged that even two foot shoulders may not be possible in some constrained areas).

In areas where additional unpaved width is available next to the two foot paved shoulder, it was decided that some type of wall or barrier would be necessary to prevent vehicles from using the unpaved part of the roadway to park. This brings up the issue of snowplows, which would require a smooth, defined roadway edge. For this reason, simply placing boulders at the edge of the paved roadway surface (to prevent vehicles from pulling off the pavement) would not work, as they would not provide a guide for the snowplow blade. Alternative barrier treatments such as K-Rail may not be possible for this area due to scenic considerations, although alternative K-Rail or barrier treatments

K-Rail Duplicating Look of Historic Stone Wall

that duplicate the look of the area's natural stone walls are possible (see photo). Specific designs for any barriers would need to be developed by Caltrans in conjunction with TRPA once final plans for shoulder widening are in place.

From Vikingsholm to the top of the Viaduct, the roadway width is fixed by the width of the Viaduct. Some shoulder widening through this location may be possible through lane restriping.

SEGMENTS 3 AND 4: EMERALD BAY STATE PARK TO MEEKS BAY

North of the top of the Viaduct, there generally appears to be sufficient roadway width to add four-foot shoulders the entire distance to Meeks Bay. There are some exceptions at constrained points, such as the area just south of the D.L. Bliss State Park entrance, but wide shoulders already exist along much of this segment of highway.

TRANSIT/SHUTTLE BUS

Given that the engineering and environmental analysis concluded that a Class I or other off-street bike path would not be possible for the entire length of the study corridor, other options were examined for ensuring access for more family-type cyclists who do not want to ride on the road or are unable to ride the steep hills involved in the route. One option considered was the provision of transit or shuttle options, either through use of existing transit vehicles or a new bike trailer

One benefit of bike shuttles is that people may be more willing to try and bicycle all or parts of the corridor if they are assured that they can get a ride back or "bail out" of the ride along the way if the hills get too steep.

A key shuttle stop location would be the intersection of Spring Creek Road/SR-89, along with informational signage and maps showing options for access to Emerald Bay State Park. This signage would focus on recreational riders who reach the end of the Pope-Baldwin Bike Path and wish to continue on.

Other bike shuttle stops would be placed at major visitor destinations along the route. These would include:

- Eagle Point Campground
- Inspiration Point/Bayview
- Eagle Falls Parking Area
- Vikingsholm Parking Area
- Emerald Bay Park Service Road (new major transit stop, described below)
- D.L. Bliss State Park Entrance
- Lester Beach

- Paradise Flat (at bottom of grade up to D.L. Bliss)
- Meeks Bay Resort and Marina

For locations with visitor attractions, such as Vikingsholm and Eagle Falls, features such as bike racks would need to be installed. This would permit a person to cycle to that location, lock up their bike and hike around the Park, then take a shuttle back to the starting point.

In conjunction with the Off-Highway Bikeway option discussed above, a new shuttle/transit stop near the Emerald Bay service road is recommended. While this location would not get cyclists all the way to the Vikingsholm Parking area, it would bring them into the northern portion of Emerald Bay State Park, where they could walk down the service road and access hiking trails into the park to reach the Vikingsholm area. A shuttle stop or trailhead located near the Emerald Bay service road would be preferred compared to one at the Vikingsholm parking lot location. The main reason for this preference is the grade of the viaduct section and difficulty this section would produce for the casual cyclist. Key features of the transit/shuttle stop at this location would be a pullout for a shuttle bus, clear signage indicating bicycles are not allowed to use the Emerald Bay service road, bike racks for cyclists to lock up their bikes if they wish to hike down toward Vikingsholm, and other amenities such as benches and directional/mileage signs for cyclists wanting to continue on-road toward Eagle Falls/Inspiration Point or South Lake Tahoe. If space is available, construction of a small number of parking spots may be desirable to reduce pressure on the Vikingsholm lot.

WATER FERRY

Discussions of a water ferry option generally led to the conclusion that a bicycle water ferry is a unique and potentially viable option for bicycle recreation and transit, but that there are two distinct paths to its development: 1) in terms of bicycle transit, increased bicycle access on ferries and improved ferry stops/service should be part of the broader scope of improving waterborne transit throughout the Tahoe Basin; and 2) in terms of a unique recreational activity, a bicycle-only ferry pilot project could be implemented and run by a local non-profit or bicycle advocacy group.

A key issue related to the water ferry discussion, was whether such a bicycle water ferry would enter Emerald Bay, dock at Emerald Bay, or simply bypass Emerald Bay in a direct trip between the Camp Richardson and Meeks Bay areas. It was assumed that trips that entered into Emerald Bay would attract more users. However, these types of trips would serve through-cyclists less, in that the trip length would be significantly increased by entering Emerald Bay. In terms of a bicycle ferry docking at Emerald Bay, the major issue was what bicyclists would do with their bicycles. The Vikingsholm/Emerald Bay area does not permit bicycling, therefore cyclists would simply be required to lock their bikes up upon disembarking.

For a non-profit pilot project, the bike ferry option was viewed as being a modified pontoon boat or other small craft that could accommodate bicycles, in order to keep costs down, and allow docking at existing landings in Camp Richardson and Meeks Bay. However, due to the small size of such watercraft, the trip between these locations could be too long to attract cyclists. In addition, the ferry would not have the ability to allow visitors to get off and explore areas between the two

landing points. As such, this type of service would likely be more oriented more as a recreational experience, rather than an efficient means of connecting between destinations along the study corridor

SUMMARY

If all of the preferred bikeway concepts identified in this chapter were implemented, the SR-89 corridor would be more accessible to a wide range of cyclists, from experienced road riders to casual family cyclists on rented bikes. In order to truly be effective, these improvements would need to be performed in conjunction with new transit stops on either end of the corridor and in South Lake Tahoe, reduced parking at the Emerald Bay/Vikingsholm area, improvements to reduce informal parking along the shoulder of SR-89, and improved bicycle facilities at the major destinations along the corridor. Taken together, the Preferred Concept options would result in a substantial change in the way that visitors access the Emerald Bay/Vikingsholm areas, shifting from the current automobile-oriented trips to a more sustainable non-motorized and transit-oriented focus. In the long term, these changes would be expected to improve enjoyment of the SR-89 corridor for visitors and local residents alike, by reducing traffic congestion and improving the overall recreational experience at Emerald Bay.

5. DESIGN GUIDELINES

This chapter provides specific design guidelines and standards to ensure that bikeway facilities developed along the SR-89 Cascade to Rubicon Bay corridor are constructed to a consistent set of the highest and best standards currently available in the United States. Ultimately, such bikeway facilities must be designed to meet both the operational needs of motor vehicles and the safety of bikeway users. The challenge is to find ways of accommodating both types of uses without compromising safety or functionality.

Planning, design, and implementation standards in this document are derived from the following sources:

- California Department of Transportation (Caltrans), Highway Design Manual, Chapter 1000: Bikeway Planning and Design, 2001.
- American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 1994.
- AASHTO, Guide for the Development of Bicycle Facilities, 1999.
- U.S. Department of Transportation (USDOT), Federal Highway Administration (FHA), Manual of Uniform Traffic Control Devices (MUTCD), 2000.
- USDOT, FHWA, Selecting Roadway Design Treatments to Accommodate Bicycles, 1994.
- USDOT, FHWA, Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice, 1994.
- Institute of Transportation Engineers (ITE), Design and Safety of Pedestrian Facilities, 1994.

Except for Caltrans guidelines for bikeways, all design guidelines must be considered as simply design resources, to be supplemented by the professional judgments of the designers and engineers.

BIKEWAY DESIGN GUIDELINES

The California Department of Transportation (Caltrans) has developed specific design guidelines in the Highway Design Manual for bikeways, including bike paths, bike lanes, and bike routes. Off-street portions of the SR-89 bikeway concepts should be designed to Class I bikeway standards wherever possible. According to Caltrans, a Class I bikeway (bike path) provides a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross-flow minimized.

For on-road portions of the identified SR-89 bikeway concepts, Class II bike lanes are not envisioned, for the reasons discussed in chapters 3 and 4. For the On-Highway Bikeway, four foot

shoulders are recommended where possible. For the Off-Highway Bikeway, a signed Class III bike routes on the residential streets is proposed.

Caltrans standards are intended to be a guide to engineers in their exercise of sound judgment in the design of projects. Design standards should meet or exceed the Caltrans standards to the maximum extent feasible. Lower standards may be used "when such use best satisfies the concerns of a given situation." Mandatory design standards, identified with the word "shall," are those considered most essential to achievement of overall design objectives. Advisory standards, identified with the word "should," are important but allow for greater flexibility. Permissive standards are identified by the words "should" or "may," and can be applied at the discretion of the project engineer. Designs which deviate from the mandatory Caltrans design standards shall be approved by the Chief of the Office of Project Planning and Design, or by delegated Project Development Coordinators.

The following section establishes the basic design parameters for Class I bikeways (paved multi-use trails) as developed by Caltrans. Mandatory standards are shown in italics.

MULTI-USE PATH STANDARDS

RECOMMENDED WIDTH

The recommended minimum width for Class I paved multi-use trails in California is eight feet, with two feet of lateral clearance and eight feet of vertical clearance. If the trail is projected to have high volumes of bicyclists, or if maintenance vehicles will be using the trail on a regular basis, a minimum width of 12 feet is preferred with the same lateral and vertical clearances. If possible, three-foot-wide unpaved shoulders with a compacted surface (often decomposed granite) should be located on each side of the paved surface to accommodate joggers and others who prefer a softer surface. In environmental sensitive areas of the corridor such as wetlands or SEZs (discussed below), design exceptions should be considered to reduce bike path shoulder widths to limit earthwork and vegetation clearing. **Figure 5-1** illustrates a typical Class I bike path cross section.

STRIPING & STENCILS

A yellow centerline stripe may be desirable (but is not required) on sections of the trail that have heavy usage, curves with restricted sight lines at approaches to intersections, and/or where nighttime riding is expected. Recommended pavement markings can be derived directly from the Caltrans Highway Design Manual (Chapter 1000) and the MUTCD.

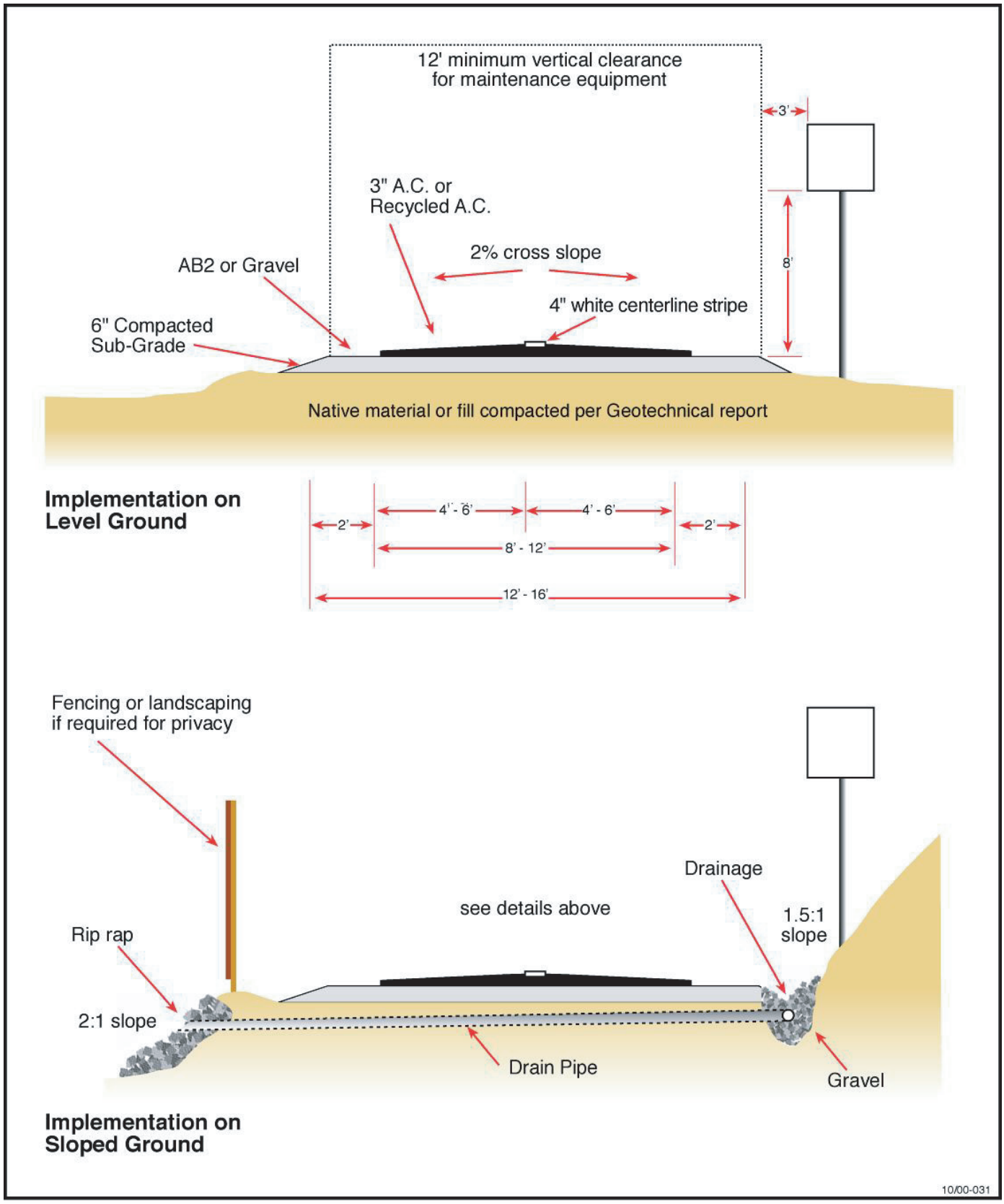
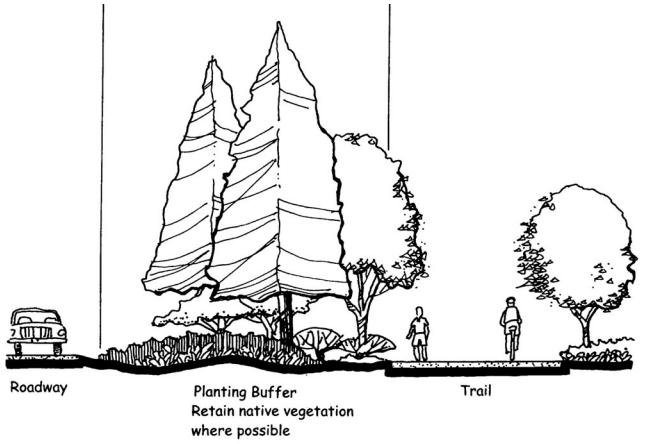


Figure 5-1
Typical Class I Bicycle Path Cross-Section

BIKE PATH-ROADWAY INTERFACES

Several proposed segments of the Off-Highway Bikeway would involve a Class I bike path parallel to SR-89. Providing a separation between the bike path and highway is important for both user safety and to provide a more enjoyable recreational experience. The type and width of separation (from the roadway) provided for trails paralleling roadways will vary dependent upon site-specific conditions, such as available right-of-way, type of vegetation along the roadway, and potential environmental impacts related to sensitive habitat, wetlands, or SEZs. In general, the higher the traffic speeds, the greater the separation desired. Native vegetation and existing features (rock outcroppings, rolling topography) should be used whenever possible and supplemented by additional landscape screening and buffering to promote a more enjoyable and safer user experience.

Vegetation Buffer Between Bike Path and Roadway



Roadway crossings represent one of the key obstacles to trail implementation. Motorists are often not expecting to see bicyclists and pedestrians at unprotected locations. In general, trail crossings should occur at established pedestrian crossings wherever possible, or at locations completely away from the influence of intersections. Mid-block crossings should address right-of-way for the motorist and trail user through use of Yield or Stop signs, or traffic signals that can be activated by trail users. Trail approaches at intersections should always have Stop or Yield signs to minimize conflicts with autos. Bike Crossing stencils may be placed in advance of trail crossings to alert motorists. Ramps should be placed on sidewalk curbs for bicyclists.

The identified Class I segments of the Off-Highway bikeway would involve relatively few roadway crossings along its alignment, all of which would occur as the trail passed north-south through the Paradise Flat area parallel to SR-89. The private roadways that intersect the east side of SR-89 in this area – One Ring, Two Ring, Three Ring and Four Ring Roads – provide access to a cluster of residences near the Lake. Traffic on these roads is limited to local landowners only. Despite the low volume of traffic, when considering a proposed off-street bike path and required at-grade crossings of roadways, it is important to remember two items: 1) trail users will be enjoying an auto-free experience and may enter into an intersection unexpectedly; and 2) motorists may not anticipate bicyclists riding out from a perpendicular trail into the roadway. However, it is expected that these at-grade trail crossings can be properly designed to a reasonable degree of safety and to meet existing traffic engineering standards.

Given the low traffic volumes, uncontrolled crossings (unsignalized, but with other traffic control devices) are appropriate for the Ring Roads. Crosswalks and warning signs ("Bike Xing") should be provided for motorists, and STOP signs and slowing techniques (bollards/geometry) used on the trail approach. Care should be taken to keep vegetation and other obstacles out of the view line for motorists and trail users. **Figure 5-2** illustrates a typical unprotected trail crossing.

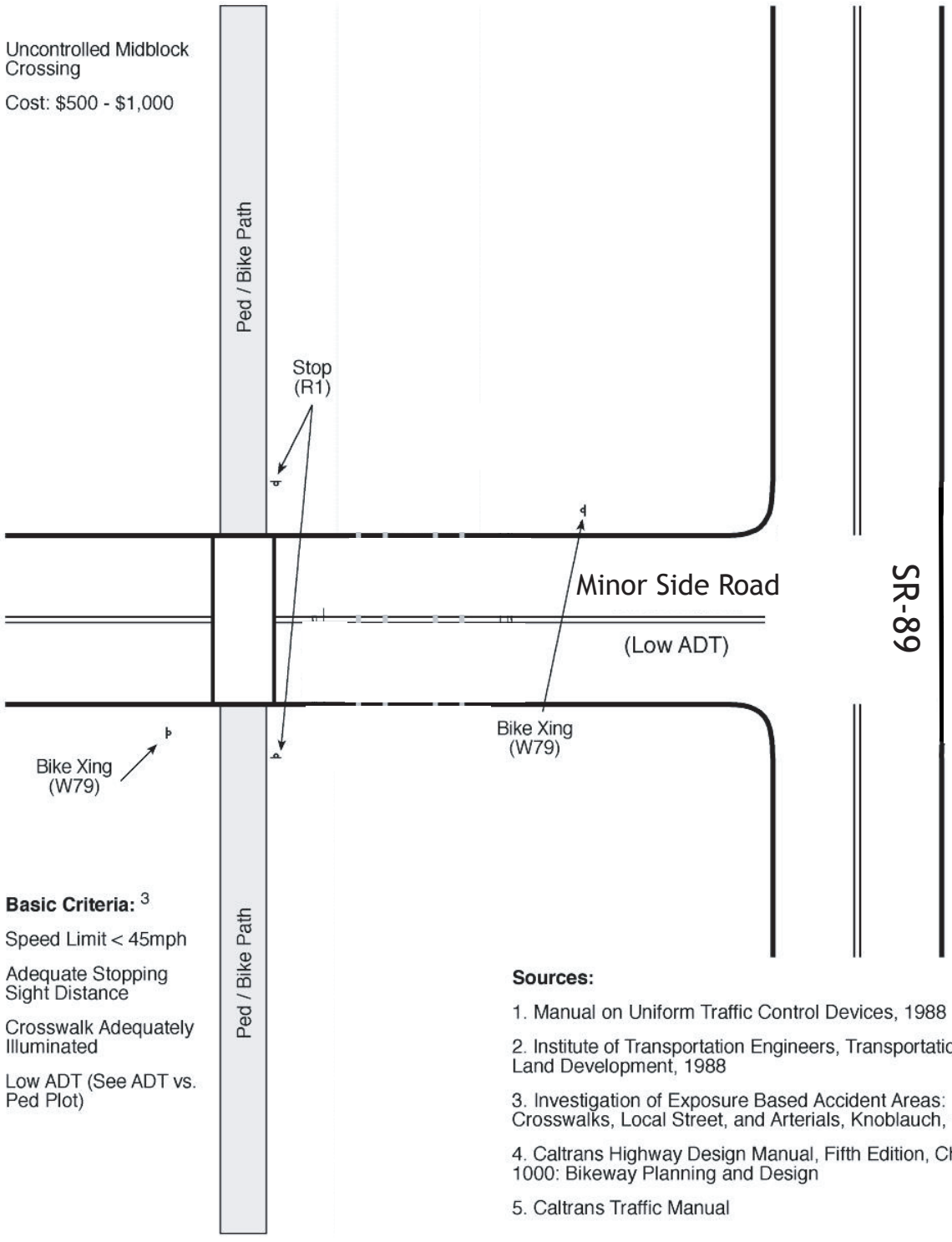


Figure 5-2
Typical Unprotected Trail Crossing

DESIGN SPEED

The minimum design speed for bike paths is 25 miles per hour. On sections where there are long downgrades (steeper than 4%, and longer than 500 feet), the design speed is 31 miles per hour. Speed bumps or other surface irregularities should never be used to slow bicycles.

HORIZONTAL ALIGNMENT

Recommended curve radii and superelevations (banking) can be calculated per equation 1003.1C in Chapter 1000 of the Caltrans Highway Design Manual. A 2% cross slope is recommended for drainage, and should generally not be exceeded. The off-street portions of the SR-89 Bikeway should have only gradual curves, and sharp curves are generally not anticipated along the trail, except at trail entrance/exit points and at transitions at the north and south ends of the corridor.

LATERAL CLEARANCE ON HORIZONTAL CURVES

Stopping sight distance, stopping sight distance on horizontal curves, and lateral clearance can be calculated using equations 1003.1D, E, and F in Chapter 1000 of the Highway Design Manual. Due to the topography and forested vegetation along the SR-89 corridor, the final trail alignment should ensure adequate sight distances on curving sections of trail. This is especially important in areas where the trail will cross roadways (e.g. the Ring Roads), or will transition onto a Class III route as proposed in the Off-Highway Bikeway option.

GRADIENTS

Steep grades should be avoided on any multi-use trail, with 5% the recommended maximum gradient. Steeper grades can be tolerated for short distances (up to about 500 feet). Gradients greater than 5% may be unavoidable along some portions of the proposed Off-Highway bikeway alignment. In these situations, the design speed should be increased and additional width should be provided. In these cases, the Hill (W7-5) sign may be installed to warn bicyclists of conditions ahead. To reduce the number of signs, a pavement marking stating "Slow Steep Grade" could be placed prior to the hill. Such signage could be installed, for example, on the Off-Highway Bikeway segment utilizing the D.L. Bliss State Park entrance road.

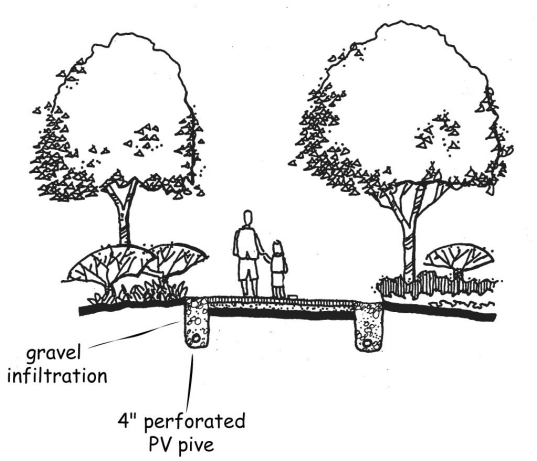
Sample Signage Indicating Steep Grade Ahead

STRUCTURAL SECTION

Bike path construction should be conducted in a similar manner as roadway construction, with sub-base thickness to be determined by soils condition and expansive soil types requiring special structural sections. Minimum asphalt thickness should be 3 inches of Type A or Type B as described by Caltrans Standard Specifications, with 3 inch maximum aggregate and medium grading. The preferred pathway material for the SR-89 Bikeway is a 4-inch asphalt concrete material with sub-base or 6 inches of reinforced concrete on compacted native material (if suitable).

DRAINAGE

Infiltration Trench Along Bike Path



The 2% cross slope will resolve most drainage issues on a bike path, except along cut sections where uphill water must be collected in a ditch and directed to a catch basin, where the water can be directed under the trail in a drainage pipe of suitable dimensions. Caltrans is required to comply with stormwater discharge requirements for the Lake Tahoe Basin that are specified in the Caltrans Statewide Permit., Tahoe Basin construction permits, and the Lahontan RWQCB Basin Plan. In some cases, the requirements may be met by allowing unconcentrated runoff from bike paths to sheet flow to infiltrate in the unpaved shoulders or adjacent vegetated areas. In other areas, particularly where water is collected in a ditch or the bike path is adjacent to SR-89, additional measures may be needed to treat stormwater runoff. Chapter 4 of the Basin Plan notes that specific stormwater runoff control measures can be found in a variety of BMP handbooks, including the "State of California Stormwater Best Management Practices Handbooks," prepared by the American Public Works Association Storm Water Task Force, and the TRPA's 1988 BMP Handbook.

BARRIER POSTS

Posts at trail intersections and entrances may be necessary to keep vehicles from entering. Posts should be designed to be visible to bicyclists and others, especially at nighttime, with reflective materials and appropriate striping. Posts should be designed to be moveable by emergency vehicles.

FENCING

Fences are the most common type of physical barrier used in trail corridors. A number of fencing types are available, ranging from simple low wood rail fences to tall, heavy-duty steel fences. Selection of a fencing type depends on the amount of trespassing anticipated along a given segment of the RWT, and the aesthetic qualities desired. Low wood split rail fences are currently used in the area and are recommended to separate path users from adjacent property.

SIGNING AND MARKING

Off-highway portions of the SR-89 Bikeway should be designed to include all of the required and recommended signing and marking standards developed by Caltrans in Chapter 1000 of the Highway Design Manual. In addition, all signs and markings should conform to the standards developed in the Manual of Uniform Traffic Control Devices (MUTCD).

In general, all signs should be located three to four feet from the edge of the paved surface, have a minimum vertical clearance of 8.5 feet when located above the trail surface and be a minimum of

four feet above the trail surface when located on the side of the trail. All signs should be oriented so as not to confuse motorists. The designs (though not the size) of signs and markings should be the same as used for motor vehicles.

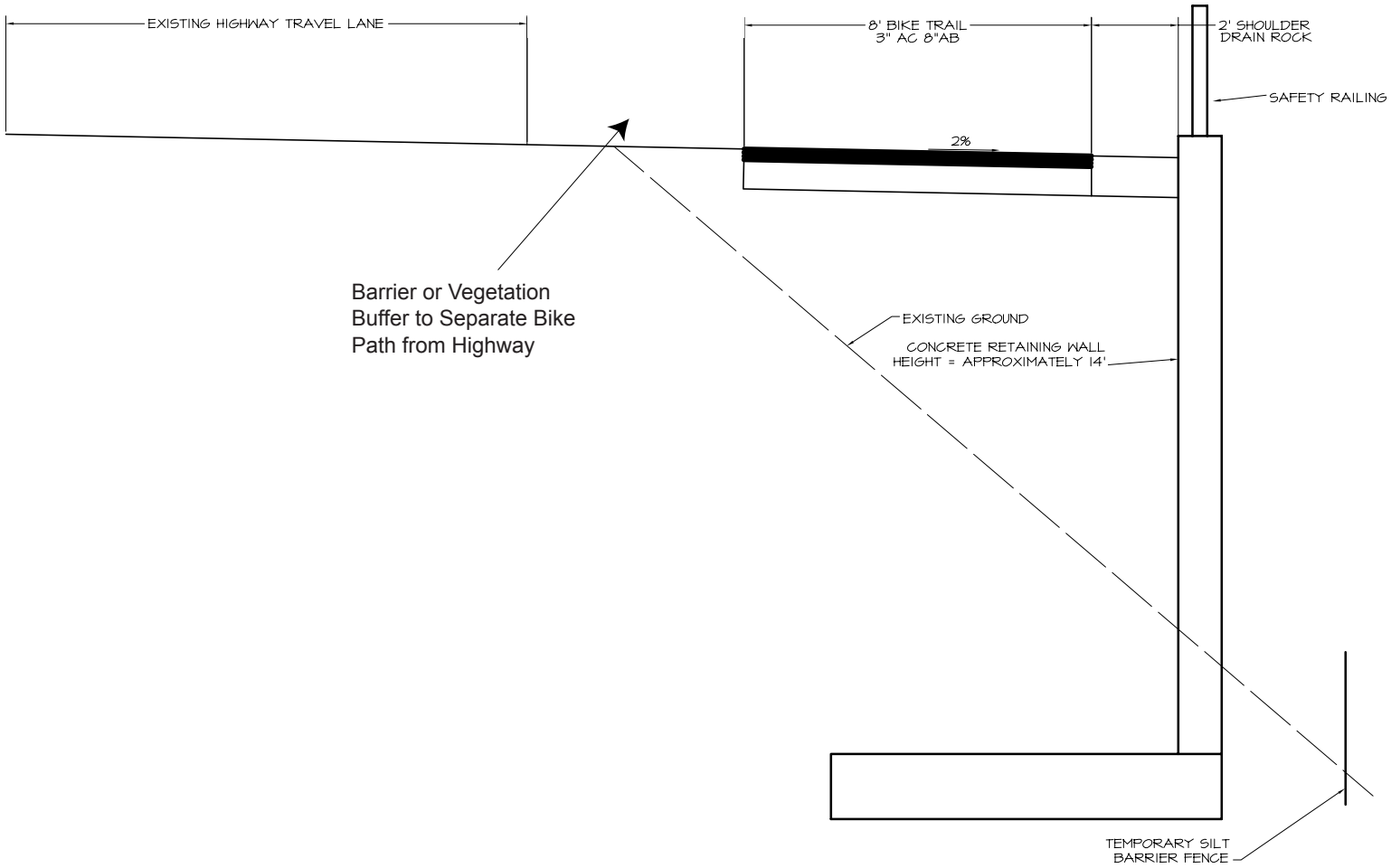
ENTRANCE FEATURES

Major entrances to the bikeway may contain a variety of support facilities and other items, depending on available resources and local support. Typical entrance features would include:

- Trailheads. The trail will draw substantial numbers of users during peak times. Trail users could be directed to specific trailheads where parking and other amenities are provided, helping to relieve some of the pressure on residential and commercial areas. Trailheads may also contain drinking fountains, telephones, restrooms, bike lockers, and other features. Trailheads should be accessible by transit service.
- Bollards. A single 48-inch wood or metal bollard (post) should be placed on the centerline of the trail at all entrances to prevent motor vehicles from entering the trail. The bollard should be designed with high reflective surfaces and be brightly painted. The bollard should be locked to a ground plate and be easily removed by emergency vehicles.
- Other Entrance Features. The trail alignment should have a sharp (20 foot or less radius) curve at all major roadway intersections wherever physically possible, to help slow bicycles. Entrance circles may be constructed with a 20-foot inside radius to help slow bicycles. Entrance signs may be placed in the circle. Entrance signs should include regulations, hours of operation (if any), and trail speed limit. Entrance signs may also include sponsorships by local agencies, organizations, and/or corporations. Signs may be placed at the entrances or at appropriate locations along the trail that provide brief descriptions of historic events or natural features.

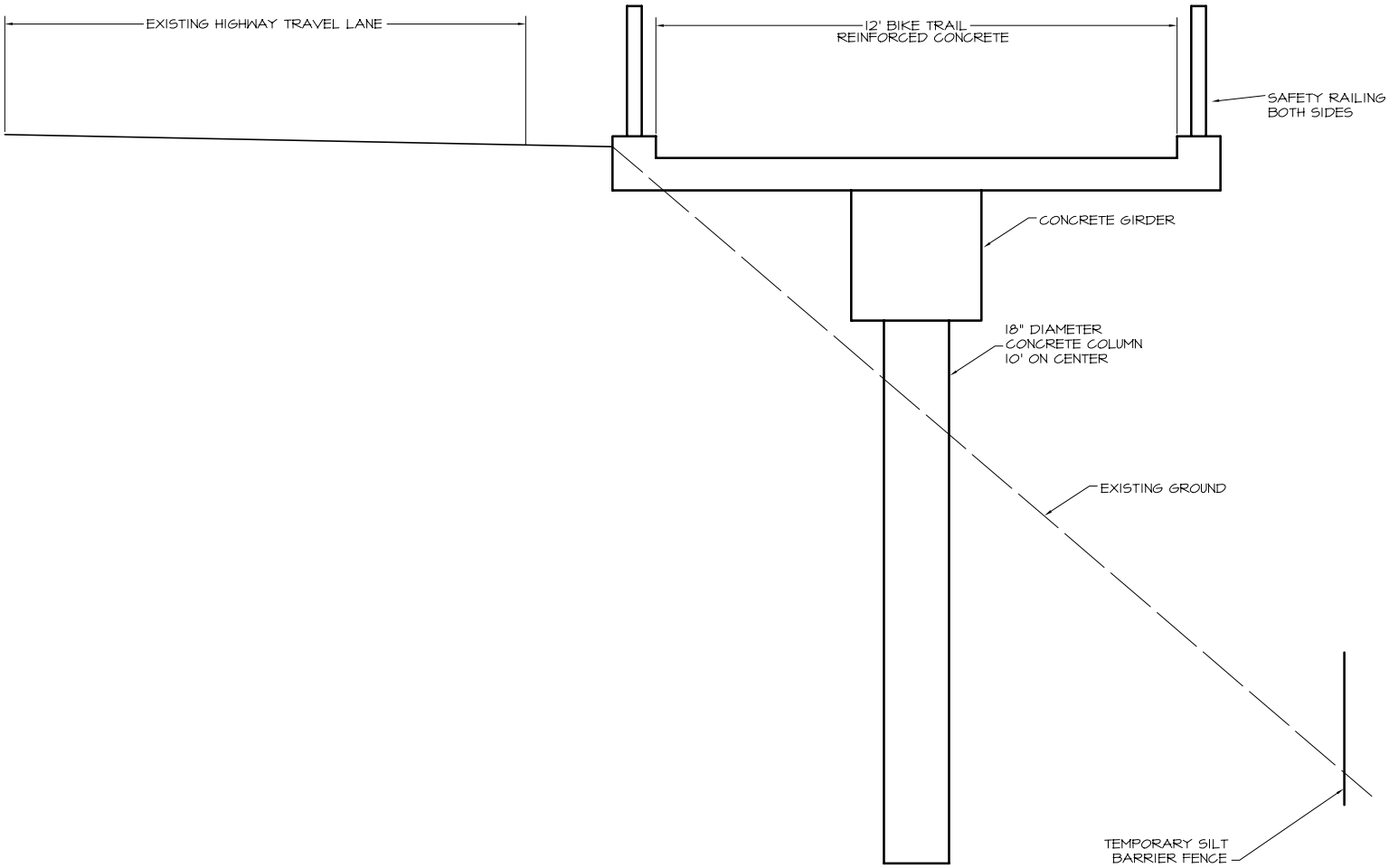
RETAINING WALLS

Retaining walls will be necessary along some portions of the proposed trail where grading is required to construct a level path. A three-foot graded area between the wall and pathway is desirable to provide clearance and increase the comfort level of bicyclists and pedestrians using the pathway. In some areas of the corridor, such as the steeply slope section between the Emerald Bay Service Road and the D.L. Bliss State Park entrance, it may be necessary to construct a retaining wall or raised bridge type structure in order for the trail to follow the highway. These concepts are illustrated in **Figures 5-3, 5-4 and 5-5**.



Note: Infiltration features (not shown) would be required per RWQCB

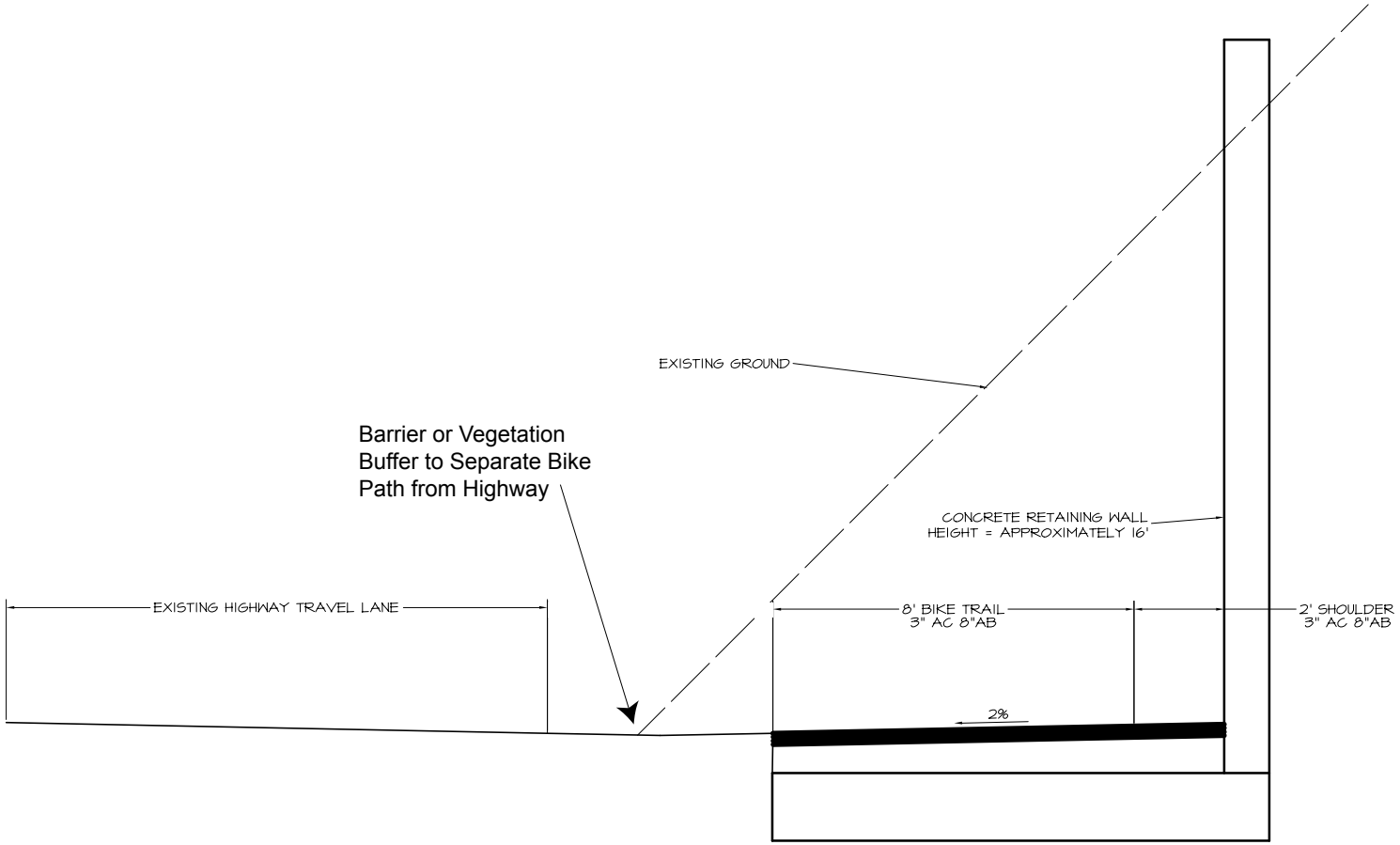
Figure 5-3
Bike Path Cross Section on Fill Slope Area with Retaining Wall



Note: Infiltration features (not shown) would be required per RWQCB

Figure 5-4
Bike Path Cross Section on Fill Slope Area with Raised Bridge Structure

alta PLANNING + DESIGN



Note: Infiltration features (not shown) would be required per RWQCB

Figure 5-5
Bike Path Cross Section on Cut Slope Area with Retaining Wall

In environmentally sensitive areas of the corridor, low retaining walls made of rock, block, or timber should be considered to replace wide, gradual cut/fill slopes that will require significant revegetation.

DESIGN FOR ENVIRONMENTALLY SENSITIVE AREAS

To reduce the area of impact in environmentally sensitive areas, design exceptions to Class I standards should be considered to reduce overall bike path widths. In particular, the two-foot unpaved shoulders on each side of the eight-foot path could be reduced, or possibly eliminated provided enough horizontal/vertical clearance from adjacent vegetation was maintained to not pose a safety hazard. Low retaining walls made of rock, block or timber could replace engineered cut/fill slopes to reduce the width of vegetation clearing and earthwork necessary for trails developed in sloping terrain. For SEZ and wetland areas, alternative bike path designs such as boardwalks or bridge spans should be considered.

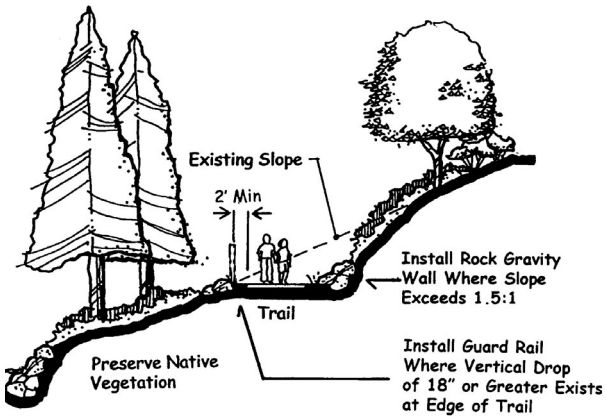
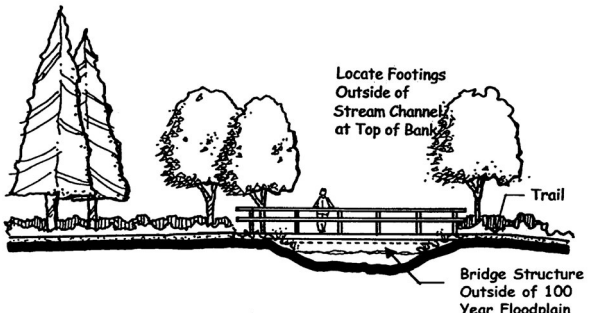
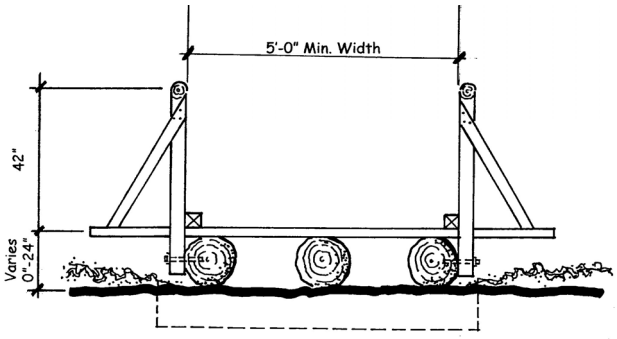


Illustration of Low Retaining Wall in Steep Slope Area



Bridge Span Concept



Boardwalk Concept

CLASS II BIKE LANES

As noted earlier, Class II Bike Lane striping/stenciling is not proposed for the On-Highway Bikeway option. Wide shoulder striping was determined to be the appropriate on-road bikeway treatment for the SR-89 corridor. This treatment is discussed below under Class III Bikeways.

CLASS III BIKEWAYS

Generally referred to as a "bike route," a Class III bikeway provides routes through areas not served by Class I or II facilities or to connect discontinuous segments of a bikeway. Designated bike routes should provide benefits to bicyclists over other alternative roadways by adjusting traffic control devices to give priority to bicycles, restricting on-street parking, more frequent maintenance, and/or better surface conditions.

Class III facilities can be shared with either motorists on roadways or pedestrians on a sidewalk (not advisable) and is identified only by signing. There are no recommended minimum widths for Class III facilities, but when encouraging bicyclists to travel along selected routes, traffic speed and volume, parking, traffic control devices, and surface quality should be acceptable for bicycle travel.

On-Highway Bikeway Option

With the implementation of widened shoulders, as discussed in chapter 4, the entire length of SR-89 from Spring Creek Road to Sugar Pine Point State Park is a recommended Class III route. Where possible, four-foot shoulders are desired on both sides of the roadway, although two-foot shoulders may be the only possibility along some roadway segments.

In some constrained areas it may not be possible to widen the shoulder on both sides. In these areas, providing a wider shoulder on the uphill side only should be considered. This "differential" shoulder striping would provide the greatest benefit to slow-moving bicyclists, giving vehicles additional room to pass without crossing the centerline.

Off-Highway Bikeway Option

Two Class III segments are recommended on low-traffic roadways as part of the Off-Highway Bikeway option. Existing Park roads in D. L. Bliss State Park will lead bicyclists from the Service Road to the main Park entrance and the Lester Beach Transit Stop. Other off-highway on-street bike route will follow low-traffic residential streets in Rubicon Bay that roughly parallel SR 89.

SIGNAGE

Class III bike routes are signed with the Bike Route (D11-1) sign. These signs should be located at regular intervals along the route so bicyclists know they are still on the preferred route and bicyclists entering the bikeway from side streets are aware that they are on the bike route. These signs can provide more functionality if they are combined with supplemental plates beneath them. These plates can indicate a directional change in the bikeway, lead bicyclists to key destinations, or give distances.

To avoid sign clutter along scenic portions of SR-89, minimal bike route signs are recommended on the highway. However, bike route signs with directional arrows should be installed along the on-street segments of the proposed Off-Highway Bikeway alignment, particularly where the route changes streets. At a minimum, these signs should indicate changes in direction and point out popular destinations.

BICYCLE PARKIING

Bicycle parking is recommended at enhanced transit stops and visitor attractions along the corridor. Long-term parking, such as bike lockers, may not be appropriate in most locations. Bike racks will be adequate for the visitors that want to lock their bicycles while they hike, stop for food and drink, or rest.

When choosing bike racks, there are a number of things to keep in mind:

- The rack element (part of the rack that supports the bike) should keep the bike upright by supporting the frame in two places allowing one or both wheels to be secured.
- Position racks so there is enough room between adjacent parked bicycles. If it becomes too difficult for a bicyclist to easily lock their bicycle, they may park it elsewhere and the bicycle capacity is lowered. A row of inverted "U" racks should be situated on 30" minimum centers.
- Empty racks should not pose a tripping hazard for visually impaired pedestrians. Position racks out of the walkway's clear zone.
- When possible, racks should be in a covered area protected from the elements.

Figure 5-6 shows common bike racks styles.

BIKES AND TRANSIT

The ability to bring bicycles on buses and trolleys is essential to encourage bicyclists to extend travel distances, allow them to avoid steep hills or potentially dangerous roadways, and provide safe travel in the dark. Standard front-loading bus bike racks hold two bicycles, are designed for easy loading/unloading, and meets California Motor Vehicle Code regulation for maximum protrusion lengths of buses. However, because the rack can only hold two bicycles, visitors could face long waiting periods until a bus arrives with available space, especially during peak periods. A four-bike front-loading rack has been developed and is used on some buses from Tahoe City. Bike trailers designed to carry several bicycles pulled by the transit buses could be another option during especially heavy use.

In addition to front-loading racks, bicycles should be allowed inside the bus or trolley. Open spaces or folding bench seating that can create more open space would provide an area for in-board bicycles. These areas are usually designated for wheelchair users, and they must take priority over in-board bicycles.

Many of the transit vehicles in use along this corridor are the vintage look trolley buses. Some people are concerned that bike racks and trailers would distract from the charm of these vehicles. Although the appearance of the trolley would change with the addition of bike racks, the functionality of the transit service would be improved for cyclists.

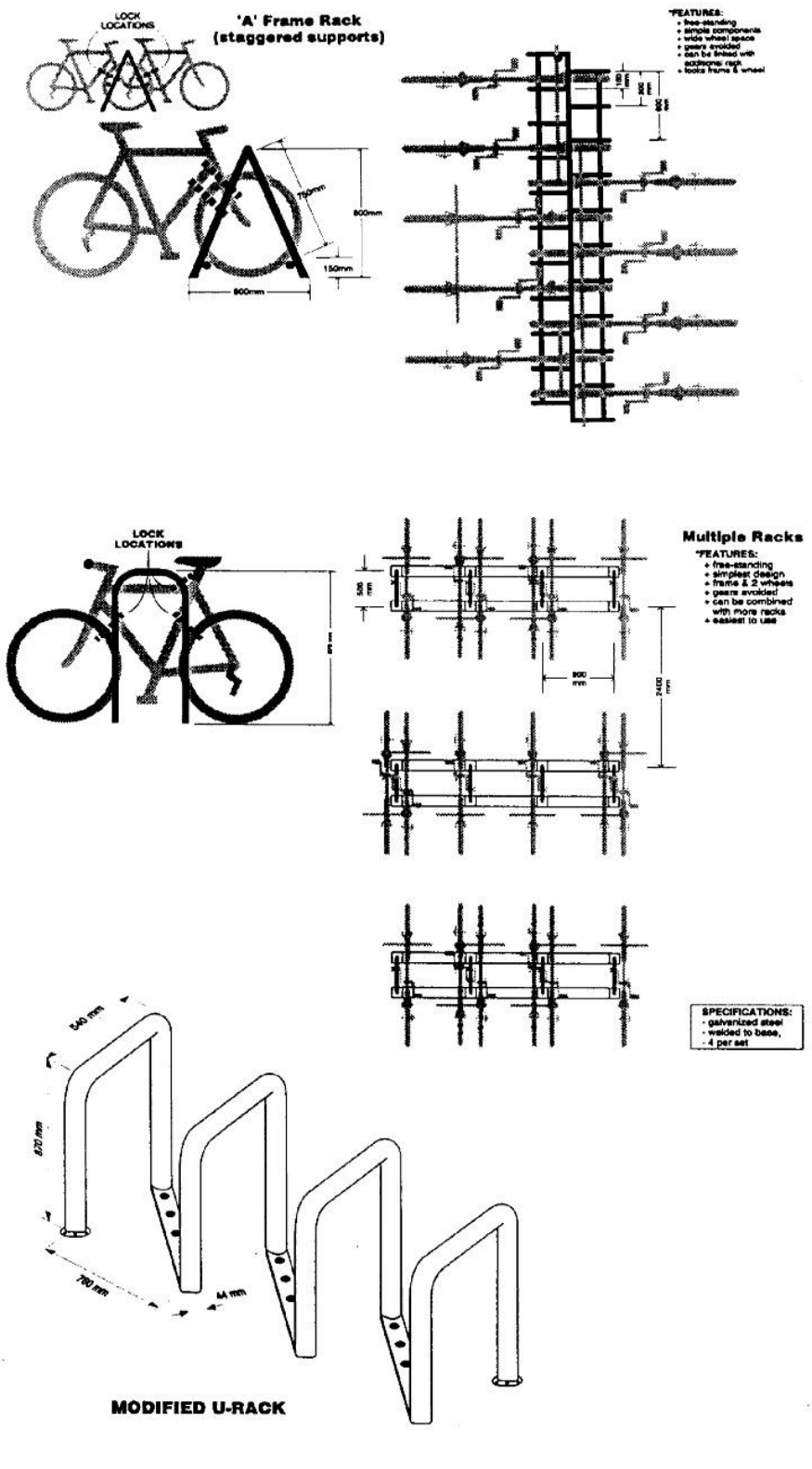


Figure 5-6
Common Bike Rack Styles

6. PHASING AND IMPLEMENTATION

The identified Preferred Bikeway Concepts for the SR-89 Cascade to Rubicon Bay corridor involve a number of different options for improving bicycle access to the corridor. These improvements will not occur immediately, and will most likely be implemented in several phases and over a number of years. For each alternative, additional planning, design, engineering, and agency coordination will be required beyond the scope of this Bikeway Study.

For each of the alternatives – off-street path, bikes on transit, bicycle water ferry – it is critical to the long-term success of that alternative that the first phase of implementation be well-used and build momentum for implementation of future phases. In addition, multiple jurisdictional support for a project will fare much better through a funding request than a project with only single jurisdictional support.

PHASING RECOMMENDATIONS

ON-HIGHWAY ALTERNATIVE

Shoulder widening along the SR-89 study corridor will be completed per the Caltrans water quality improvement project schedule, currently anticipated for completion in 2010.

OFF-HIGHWAY ALTERNATIVE

Phase I: Before this alternative can realistically be developed, extension of the West Shore Bike Path from its current terminus in Sugar Pine Point State Park to Meeks Bay needs to be completed. That extension will likely increase the popularity of the West Shore path by connecting Tahoe City to the popular Meeks Bay Resort and campground areas.

Phase II: Once the West Shore path is completed to Meeks Bay, implementation of the Off-Highway Bikeway route can begin. The first key stage of this route should be a connection to Lester Beach. This would require development of an off-street connection from Meeks Bay into the "Gold Coast" residential street network, and then development of an off-street connection along Paradise Flat into D.L. Bliss State Park.

Phase III: The third phase of the off-highway path development should be from D.L. Bliss State Park to the terminus at the top of the viaduct in Emerald Bay State Park. This phase of the bike path development would need to occur in conjunction with improvements to a new shuttle stop at the top of the viaduct, including the installation of bike locks, new trailheads, and signage into the destinations of Emerald Bay State Park (e.g. Vikingsholm, Emerald Point).

WATER FERRY

As discussed in chapter 4, a logical first step for a bicycle ferry project would be for a local non-profit group to seek grant funds to operate a pilot bike ferry project during all or a portion of the summer tourist period. This program would likely involve leasing a vessel and docking space, and offering the ferry service on a free or low-fee basis to draw initial interest in the program.

TRANSIT

Improvements to transit service and bicycle access on transit through Emerald Bay should be considered in the context of implementing changes to vehicular access to the Emerald Bay area, time limits on parking or potential reductions in parking spaces. Such changes would need to be explored in conjunction with State Parks and the US Forest Service, as well as local transit operators. In the meantime, transit operators should work to increase service and headways to the area, ensure that bicycles are permitted on all buses and trolleys (either on racks or inside the vehicle), and to promote bikes-on-transit at major lodging areas, particularly in South Lake Tahoe, to encourage visitors to try bike-bus trips into Emerald Bay. At a minimum, bicycle racks should be provided on all publicly-funded scheduled service transit vehicles serving the corridor (or equivalent bike rack capacity allowed in-vehicle), as a requirement of receiving transit funding through TRPA.

As noted above, the new transit/shuttle stop recommended for the top of the viaduct would need to be developed in conjunction with developing the final segment of the Off-Highway Bikeway, to ensure that cyclists who take that route have a transit option back toward Meeks Bay or Tahoe City.

FUNDING

FUNDING SOURCES

One of the goals of this Bikeway Study is to ensure that the region can receive funding to successfully implement the bikeway and related facilities. There are a variety of potential funding sources including local, state, and federal funding programs that can be used to construct the SR-89 Bikeway. Most Federal, state, and regional programs are competitive, and involve the completion of extensive applications with clear documentation of the project need, costs, and benefits. Local funding for bicycle projects typically comes from Transportation Development Act (TDA) funding, which is prorated to each community based on return of gasoline taxes.

Generally speaking, recreational shared use trails do not qualify for transportation funding through the TEA-21 (Transportation Equity Act for the 21st Century). TEA-21 contains two major programs, STP (Surface Transportation Program) and CMAQ (Congestion Management and Air Quality Improvements) along with other programs such as the National Recreational Trails Fund (which a recreational trail would qualify for funding), and Federal Lands Highway funds. TEA-21 funding is administered through the State (California Transportation Commission) and regional governments.

A number of funding sources are summarized below.

LOCAL SOURCES

Rental Car Mitigation Program

Rental car customers in the Tahoe Region are imposed a $4 per day fee. The TRPA collects the fees from rental car businesses and disburses the funds to the Tahoe Transportation District (TTD) for use on projects that implement the Regional Transportation Plan – Air Quality Plan. In 2002, these funds were used for operating assistance for the Tahoe Trolley and Nifty 50 Trolley programs.

SB 2766 Program

California counties are given the authority of impose a vehicle fee for funding air quality improvement programs. El Dorado County collects $4 per vehicle. These funds can be used on a variety of transportation projects that reduce automobile emissions.

Transient Occupancy Tax

The transient occupancy tax is an 8% tax levied on hotel/motel stays of 30 days or less in the unincorporated areas of El Dorado County. The funds generated from this tax are used for tourism and recreation purposes.

Traffic and Air Quality Mitigation Program

This program assesses a fee on new developments based on the number of daily vehicle trips that can be expected. Fees are paid to the TRPA, who then disburse the funds to local jurisdictions. Projects that qualify must support TRPA's 1992 Air Quality Plan and the Regional Transportation Plan.

STATE SOURCES

Environmental Enhancement and Mitigation Program (EEM)

The Environmental Enhancement and Mitigation Program is administered by the California Resources Agency to mitigate the environmental impacts of modified or new public transportation facilities. One category of eligible projects is roadside recreation, which includes trails.

Lake Tahoe License Plate Program

The California Tahoe Conservancy offers a special license plate depicting a prominent feature of Lake Tahoe. Plates cost $50 initially and $40 for an annual renewal fee. Revenue from license plate sales may be used by the Conservancy or local governments under contract with CTC. Funds can be used to construct and improve trails, pathways, and public access for non-motorized traffic within the California portion of Lake Tahoe.

Safe Neighborhood Parks, Clean Water, Clean Air, and Coastal Protection Bond Act of 2002 ("2002 Resources Bond")

In March 2002, California voters approved Proposition 40 allowing the state to issue $2.6 billion for the acquisition, protection, development, and rehabilitation of recreational, cultural, and natural areas. Several grant programs administered by the California Department of Parks and Recreation are included in Proposition 40. El Dorado County would qualify for the "Per Capita Grant

Program," which could provide $1.2 million for park and recreation facilities. Another grant, "Nonurbanized Area Need Basis Grants" of the Roberti-Z'Berg-Harris (RZH) Grant Program, provides funding for park and recreation facilities in nonurbanized areas.

Regional Transportation Improvement Program (RTIP)

"This is a funding category created by Senate Bill 45 that can be used for a variety of projects, including intermodal facilities, road rehabilitation, and bicycle and pedestrian projects. Projects are selected by the Tahoe Transportation Planning Agency based upon projects included in the Regional Transportation Improvement Program (RTIP).

State Highway Operations and Protection Program (SHOPP)

SHOPP funds can be used by Caltrans to maintain and improve state highways. The program is prepared by Caltrans biennially and approved by the California Transportation Commission.

Local Transportation Fund

The Transportation Development Act (TDA) of 1972 provides two sources of transportation funding, the Local Transportation Fund (LTF) and the State Transit Assistance (STA) fund. The LTF is derived from 1/44 of each retail sales tax dollar collected statewide, and 1/44 is returned to each county according to the amount of tax collected within its boundaries. These funds are collected by the State Board of Equalization but administered locally though the TRPA. Eligible projects may include transit, bicycle, and pedestrian purposes.

FEDERAL

Federal Lands Highway Program

These funds may be used to build bicycle and pedestrian facilities in conjunction with roads and parkways at the discretion of the department charged with administration of the funds. The projects must be transportation-related and tied to a plan adopted by the State and MPO.

Recreational Trails Program

The Recreational Trails Program provides funds to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized as well as motorized uses. These funds are intended for recreational trails; they may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads. The program was authorized in 1998 under TEA-21.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails;
- Development and rehabilitation of trailside and trailhead facilities and trail linkages;
- Purchase and lease of trail construction and maintenance equipment;

- Construction of new trails (with restrictions for new trails on federal lands);
- Acquisition of easements or property for trails;
- State administrative costs related to this program (limited to seven percent of a State's funds); and
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

Transportation Enhancement Activity Funds

Transportation Enhancement Funds are a major source of federal funds available directly for pedestrian and bicycle projects. These funds are set aside by TEA-21 in order to add community or environmental value to a completed or ongoing transportation project. An 11.8% local/state match is required to receive these federal funds.

Some eligible transportation enhancement activities include the following:

- Provision of facilities for pedestrians and bicycles
- Provision of safety and educational activities for pedestrians and bicyclists.
- Acquisition of scenic easements and scenic or historic sites
- Scenic or historic highway programs
- Landscaping and other scenic beautification
- Historic preservation
- Rehabilitation and operation of historic transportation buildings, structures, or facilities
- Mitigation of water pollution due to highway runoff

Local government projects must be sponsored by a governmental body and must be adopted as a priority by the MPO. Eligible State and federal agencies need to coordinate with the MPO. Private non-profit organizations are also able to work with governmental agencies to develop project applications. Transportation enhancement funds must be matched with other non-Federal funds in the amount of 5.7 percent of the total project cost.

7. LIST OF PREPARERS AND TAC MEMBERS

The following individuals were involved in the preparation of the SR-89 Cascade to Rubicon Bay Bikeway Study:

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- Ken Daley, ATM
- Bob Kingman, California Tahoe Conservancy
- John Warpeha, Washoe Tribe
- Damion Farley, Caltrans

APPENDIX

SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

Photos taken May 28 and 29, 2002

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

A

Terminus of Pope-Baldwin Bike Path at SR-89, facing north.

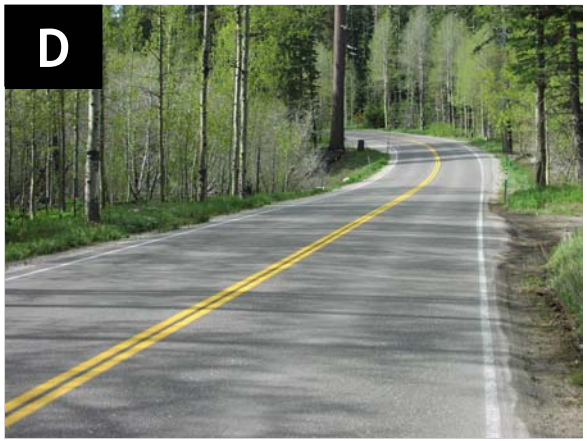
B

Terminus of bike path at SR-89, facing Spring Creek Road (south).

C

Start of SR-89 Project Corridor, mile 13.24, northbound direction. Shoulder on NB side disappears shortly after Spring Creek.

D



Approaching Spring Creek Road, southbound direction. No shoulder on SB side.

E

Heading up toward Cascade Road, northbound direction. No shoulder on NB side, but room available to widen.

F

Heading down from Cascade Road, southbound direction. No SB shoulder, and minimal room to widen due to dirt berm.

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SLIDE 1

SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

A

Approaching Cascade Road turnoff, northbound direction. Cascade Road drops down to private homes along Lake front.

B

Looking back (south) toward Cascade Road from northbound lane; Cascade Rd is visible on left side of photo, downslope from SR-89.

C

Continuing uphill from Cascade Road in northbound direction. Wide gravel shoulder on NB side.

D

Downhill approaching Cascade Road, southbound direction. Approx. 1 foot shoulder with curb at pavement edge.

E

First curve in highway after Cascade Road, northbound direction. Guardrail on NB side and retaining wall on SB side.

F

Continuing around curve, facing northbound. Pullout and guardrail on NB side, retaining wall continues on SB side.

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

A

Close-up of retaining wall in southbound lane (facing NB). Approx 1 foot of pavement between edge line and wall.

B

Continuing up toward Cascade Creek, northbound direction. Narrow shoulder and steep drop-off on NB side.

C

Approaching second curve after Cascade Road, northbound direction. Guardrail on NB side, retaining wall continues on SB side.

D

Second curve after Cascade Road, pullout in northbound lane (facing SB).

E

Facing northbound in pullout on second curve.

F

Approaching Cascade Creek, northbound direction, topography flattens and roadway widens.

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Photo Library

Facing southbound, approaching second curve above Cascade Road. Shoulder narrows and retaining wall begins on SB side.

Continuing northbound toward Cascade Creek, approaching Sugar Pine Road turn off. Continued wide shoulder on both sides.

Sugar Pine Road turn off. This road provides access to private homes in Cascade Properties neighborhood.

Approaching Cascade Creek, northbound direction. Wide shoulder on both sides is lost after Sugar Pine Road.

Facing southbound across from Sugar Pine Road turn off.

Cascade Road (northern) turnoff, facing northbound.

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Photo Library

A

Cascade Creek bridge, facing northbound. Guardrails present on both sides.

B

Heading northbound after Cascade Creek, road beginning to climb again approaching first switchback.

C

Facing southbound direction, looking down at curve before Cascade Creek bridge.

D

Northbound direction, approaching first switchback.

E

First switchback, northbound direction. Shoulder striping on NB (inside) lane has been worn away by vehicles/snow removal.

F

First switchback, southbound direction. Wide SB (outside) lane, with worn shoulder striping.

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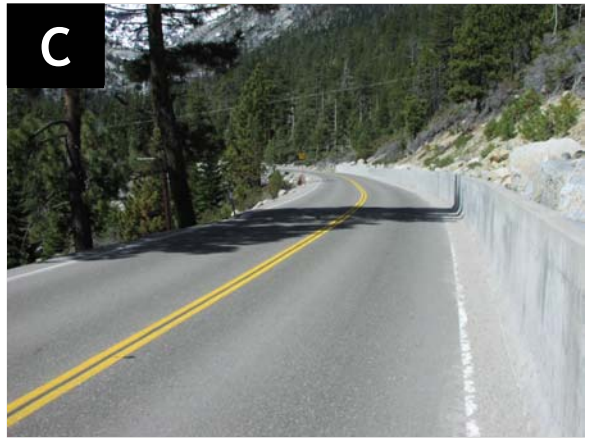
SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

Heading uphill, northbound direction, from first switchback.

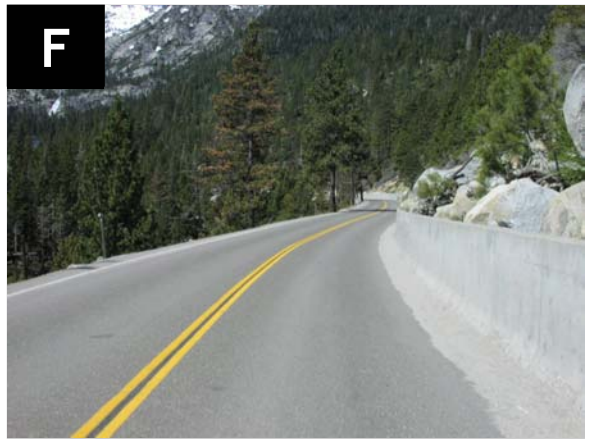
Continuing uphill, northbound, from first switchback. Retaining wall on SB side, and steep drop off from NB lane.



Heading down toward first switchback, southbound direction. Close-up of SB retaining wall and no shoulder.

Continuing uphill, northbound. Shoulder non-existent in areas, as edge stripe immediately adjacent to downslope.

Approaching second switchback, northbound direction.



Facing southbound toward first switchback. Note gravel along right side of SB lane.

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Photo Library

A

Second switchback, northbound direction. NB side has wide pull-out lane.

B

Second switchback, facing southbound from pull-out lane.

C

Second switchback, facing northbound from pull-out lane.

D

Northbound direction after second switchback. Grade flattens briefly.

E

Turn-off to Eagle Point campground.

F

Passing Eagle Point campground turnoff, northbound direction. Road begins to climb steeply from this point.

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Photo Library

A

Facing southbound direction, back toward second switchback.

B

Approaching double switchback, northbound direction.

C

First curve of double switchback, facing northbound.

D

Second curve of double switchback, facing SB (back toward first curve).

E

Second curve of double switchback, facing NB.

F

Approaching ridge of moraine, northbound direction.

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A

Continuing up in northbound direction to top of ridge.

B

Facing southbound direction from top of ridge.

C

Top of ridge, facing northbound.

D

Top of ridge, facing northbound.

E

Top of ridge, facing southbound.

F

Close-up of northbound side of road along ridge top.

SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

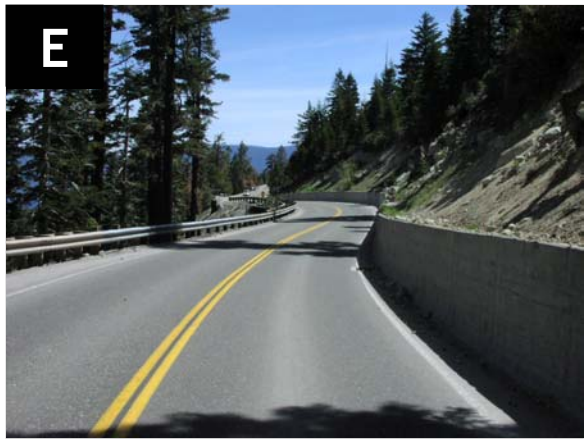
Photo Library

Close-up of southbound side of road, from ridge top.

Heading northbound away from ridge, toward Inspiration Point.

Approaching steep ridge area, southbound direction.

Continuing northbound toward Inspiration Point.



Heading southbound from Inspiration Point.

Approaching Inspiration Point and Bayview Trail parking areas, northbound direction.

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Photo Library

A

Facing southbound direction, near Inspiration Point parking area.

B

Facing northbound at Inspiration Point parking area.

C

Continuing past Inspiration Point parking area, in northbound direction. Bayview Trail parking is visible on the left.

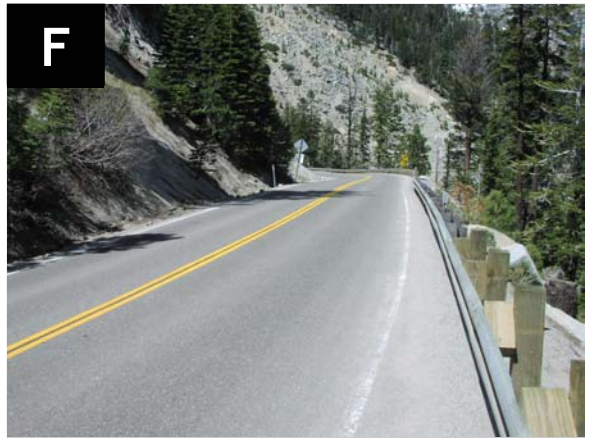
D

Facing southbound at Bayview Trail parking area.

E

Facing northbound, about to start descent down toward Eagle Falls area.

F



Descending in northbound direction.

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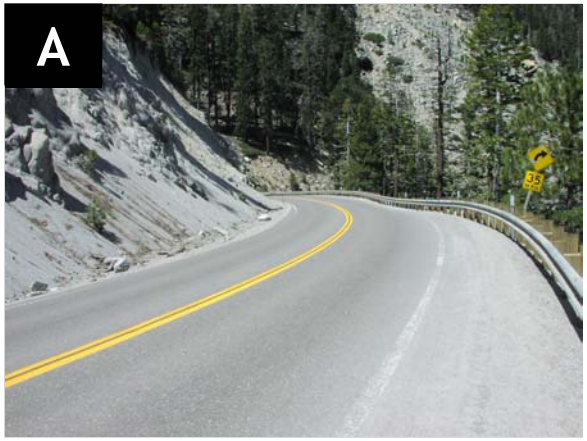
Photo Library



Continuing northbound descent.

Facing southbound, uphill climb.

Facing northbound.

Facing southbound. Pullout area.

Climbing in southbound direction.

Descending in northbound direction.

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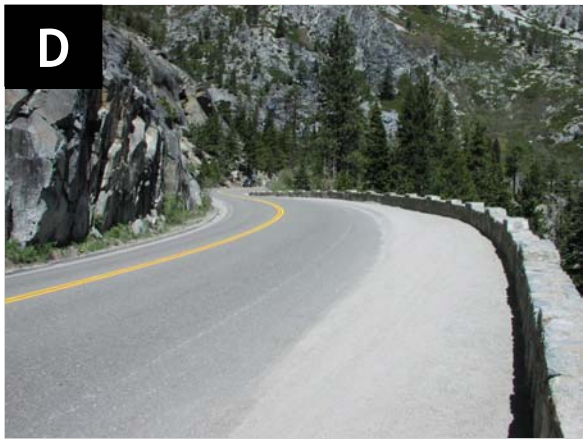
Facing northbound, brief section of stone wall instead of guardrail.

Facing southbound, uphill direction.

Northbound direction.



Northbound direction. Vehicle pullout.

Southbound direction. Note gravel covering much of shoulder.

Northbound direction, wide pullout lane.

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Photo Library

A

Southbound direction.

B

Northbound direction, approaching the Eagle Falls parking area at the bottom of the descent.

C

Bus parking zone on northbound side, just south of Eagle Falls parking area. Occupied by vehicles.

D

Southbound direction, beginning the climb up from Eagle Falls.

E

Eagle Falls bridge, looking northbound. Heavy pedestrian activity in this area.

F

Heading northbound, approaching Eagle Falls parking area on left.

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Heading southbound, approaching Eagle Falls parking area on right.

Heading northbound, beginning to climb again, approaching Vikingsholm (Harvey West) parking area on right.

Facing southbound from Vikinsholm parking area.

Vikinsholm parking area, northbound direction.

Heading northbound from Vikingsholm parking area.

Facing southbound, approaching left turn into Vikingsholm parking area.

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Photo Library

A

Heading northbound away from Vikingsholm, onto viaduct section of highway. NB shoulder is 2 feet wide abutting guard wall.

B

Continuing northbound on viaduct. Note retaining wall on SB side. NB shoulder widens briefly NB to 4 feet.

C

Heading southbound toward Vikingsholm. Shoulder isapproximately 2 feet wide along this segment.

D

Continuing northbound along viaduct.

E

Facing southbound along viaduct.

F

Approaching top of hill past viaduct, northbound direction. A pullout area is available on the northbound side.

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Facing southbound, about to start descent onto viaduct. USFS summer homes access road visible on right.

Facing USFS summer homes access road. This narrow paved road climbs above west side of SR-89 and terminates.

Facing northbound, section of rolling topography above of Emerald Bay.

Facing southbound, rolling topography above Emerald Bay.

Access road to summer homes on east side of highway within Emerald Bay State Park.

Continuing northbound on segment between Emerald Bay and D.L. Bliss State Parks.

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Photo Library

A

Facing main access road to Emerald Bay S.P. This paved road drops down to the boat camp and continues to Vikingsholm.

B

Northbound direction, now within the boundary of D.L. Bliss State Park.

C

Southbound direction. SR-89 between the viaduct and D.L. Bliss generally consists of two 11 foot lanes with 1 foot shoulders.

D

Continuing northbound toward D.L. Bliss State Park. This section of roadway includes several small rolling hills

E

Continuing northbound, within boundary of D.L. Bliss State Park.

F

Facing southbound.

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Pullout on northbound side, nearing D.L. Bliss State Park.

Northbound, west of Emerald Point.

Southbound, west of Emerald Point.

Northbound, nearing D.L. Bliss State Park main entrance. Pullout on NB side.

Southbound, traveling away from D.L. Bliss main entrance..

Northbound, approaching D.L. Bliss State Park entrance road.

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D.L. Bliss State Park main (public) entrance roadway.

Northbound direction after D.L. Bliss S.P. Roadway has wide (5 foot) shoulders on both sides in this area.

Southbound direction, wide shoulder, approaching D.L. Bliss S.P. entrance.

Northbound, rock wall visible on SB side, and 5 foot NB shoulder.

Southbound, approaching rock wall and guardrail. SB shoulder about 3 feet wide.

Northbound, within D.L. Bliss S.P., approaching curve with rock walls on both sides.

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A

Southbound direction within D.L. Bliss boundary. Shoulder on SB side 2-3 feet wide, with curb.

B

Northbound direction, approaching wide NB vehicle pullout at curve before D.L. Bliss service road.

C

Northbound, gradual descent toward D.L. Bliss service road. Note wide pullout on NB side and guardrail/retaining wall SB.

D

Southbound direction. Note guardrail and retaining wall on SB side with 2-3 foot shoulder.

E

Facing D.L. Bliss S.P. service road. This narrow paved road connects to the main park road near the staff housing area.

F

Northbound, continuing past D.L. Bliss service road and leaving the park boundary.

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SLIDE 21

SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

Photo Library

A

Southbound, heading uphill approaching the D.L. Bliss S.P. service road☐☐.

B

Northbound, descending toward Paradise Flat.

C

Southbound, climbing toward D.L. Bliss State Park.

D

Northbound, in Paradise Flat area. Relatively flat topography, 12 foot lanes with less than 1 foot shoulder each side.

E

Southbound in Paradise Flat area. Flat topography with virtually no shoulders.

F

Northbound in Paradise Flat. Four private roads extend west off SR-89 in this area: 1 Ring, 2 Ring, 3 Ring, and 4 Ring Roads.

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

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Southbound, heading into Paradise Flat area.

Northbound, climbing out of Paradise Flat toward Rubicon Bay. Roadway begins to traverse sideslope, with rock wall on SB side.

Southbound, descending toward Paradise Flat. Note steep slope abutting SB lane.

Northbound, continuing climb up to Rubicon Bay community.

Northbound. Note rock wall on SB side.

Northbound, at Rubicon Drive turnoff, first access point to Rubicon Bay residential area.

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

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Facing Rubicon Drive. This paved roadway provides access to a network of paved residential streets downslope of SR-89.

Northbound, curving westward into the Rubicon Bay community. Note guardrail on NB side, but shoulder is wide.

Southbound within Rubicon Bay area. Note steep upslope on SB side and guardrail on NB side.

Southbound, across from the Rubicon Properties office.

Northbound, at Rubicon Properties office. This small property office is located in a small pullout area just off the NB lanes.

Northbound heading away from Rubicon Properties office. Note downslope from NB lane, shoulder is narrow in this area (2 feet).

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

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Northbound.

Northbound, leaving Rubicon Bay on straightaway heading to Meeks Bay.

Southbound on straightaway. Note rocks on SB slope. Shoulder is generally 4 feet through this section.

Southbound, on straightaway between Rubicon Bay and Meeks Bay communities☐.

Northbound, entering Meeks Bay community, just before roadway curves west and descends to campground.

Southbound, climbing away from Meeks Bay campground toward curve south.

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SR-89 CASCADE TO RUBICON BAY BIKEWAY STUDY

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A

Approaching Meeks Bay USFS campground entrance, northbound direction.

B

Continuing northbound, past Meeks Bay campground entrance.

C

Meeks Bay Resort and Marina entrance, facing southbound.

D

Southbound, heading toward Meeks Bay resort area.

E

Northbound, approaching southern terminus of West Shore Bike Path.

F

Facing southern terminus of West Shore Bike Path. This path, managed by the TCPUD, continues north along SR-89 to Tahoe City.

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SLIDE 26